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NATIONAL ACADEMY OF SCIENCES.

Volume XV.

PSYCHOLOGICAL EXAMINING IN THE UNITED STATES ARMY

PART I.—History and Organization of Psychological Examining and the Materials of Examination.

PART II.—Methods of Examining: History, and Development, Preliminary Results.

PART III.—Measurements of Intelligence in the United States Army.

EDITED BY

ROBERT M. YERKES.

Submitted to the Surgeon General of the Army as the Official Report of the Division of Psychology of the Office of the Surgeon General, and published with the approval of the Department of War.

PART I.—HISTORY AND ORGANIZATION OF PSYCHOLOGICAL EXAMINING AND THE MATERIALS OF EXAMINATION.

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GENERAL INTRODUCTION.

In the organization of the forces of the United States for participation in The World War, science accepted an important rôle. Activities which during days of peace had been directed to the development of science and its industrial applications were suddenly concentrated on the vital problems of national defense. In common with the other and more exact sciences, psychology demonstrated its preparedness for wholly unexpected practical demands and responsibilities.

When, on April 6, 1917, the Nation was called to war a group of experimental psychologists promptly assembled to consider means of psychological service. As plans of action developed the size of this group, its opportunities and responsibilities, steadily increased. The materials of this report represent the methods and results of only the field of psychological examining. Other phases of psychological service, equally important with that of psychological examining, have been, or will be, presented elsewhere.[1]

This volume constitutes a complete account of the history, methods, and results of psychological examining in the United States Army. It consists of three parts. Part I is the official history of the development of the service and of its conduct during the war. It is supplemented by reproductions of the printed materials which were devised and used. Part II is devoted to a complete account of the preparation of methods, their characteristics, and their evaluation as practical procedures. In Part III the results of examining are presented in summary fashion, and, for reasons which are indicated below, wholly inadequately.

The report was prepared under extremely trying circumstances, for immediately following the armistice of November 11, 1918, pressure developed within the War Department and among the emergency personnel for early discharge. This rendered it difficult to hold, for a sufficient length of time, a competent staff of psychologists to analyze the data of examinations and to prepare materials for publication. It was necessary to choose between the preparation of a report which contained a maximum of material and one which expressed a maximum of precision. The decision rested with the first alternative. Many of the obvious defects of this volume must be charged against this practical decision.

The problem of publication was still further complicated by a sense of responsibility to two important agencies: the military establishment on the one hand and the science of psychology on the other. This dual obligation rendered the task of reporting psychological examining peculiarly difficult, and to it the remaining shortcomings of the report may fairly be ascribed. The report supplies, for the use alike of soldier and scientist, essential information concerning methods and results.

The three parts of the volume are interdependent. No one of them can be used satisfactorily, either for military purposes or in scientific research, apart from the others. To enable the reader to obtain immediately a comprehensive view of the entire report, a list of the chapters for the three parts is presented.

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The personnel system of the United States Army. Vol. I, The evolution of the personnel system; Vol. II, The personnel manual. War Dept., Washington, D. C., 1919.

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Air Service Medical, pp. 293–330. War Dept., Govt. Printing Office, 1919.

Intellectual and educational status of the medical profession as represented in the United States Army. Bulletin National Research Council, No. 8, 1921.

Entire responsibility for this volume rests with the staff of the Division (later Section) of Psychology in the office of the Surgeon General. So much of the work has been done cooperatively that no formal ascription of credit is possible. The chief service to the Army was rendered by the staffs of examiners in the training camps. It is not possible to do full justice even to those psychologists who submitted to the division field reports of special merit and value. So far as practicable, responsibility and credit for the immediate preparation of this official report are indicated in the statements prefatory to the several parts of the volume.

The Chief of the Division of Psychology expresses peculiar obligation to three staff officers who together rendered possible the completion of this volume. Maj. Lewis M. Terman assumed responsibility for the preparation of the account of methods; Capt. Edwin G. Boring directed the analysis of results, and after the separation of the Chief of the Division from the service assumed editorial responsibility; Maj. Harold C. Bingham, in addition to assisting in important ways throughout the preparation of the volume, became responsible as Chief of the Section of Psychology for the laborious and thankless task of reading proofs and preparing an index.

Without the intelligent interest and support of the Secretary of War, Newton D. Baker, and of his assistant, Dr. Frederick P. Keppel (later Third Assistant Secretary of War), and of the Chief of Staff, the establishment of the service of psychological examining in the United States Army would have been impossible.

The first step toward the introduction of psychological service was taken by Cols. Victor C. Vaughan and William H. Welch, of the Medical Reserve Corps, who as members of the National Research Council and of the staff of the Surgeon General recommended to Maj. Gen. William C. Gorgas that the methods of examining presented by the committee for psychology of the National Research Council be given practical trial. This recommendation was accepted, and the Surgeon General, with the assistance of his chief executive officer, Col. Charles L. Furbush, promptly arranged for official trial of the methods and subsequently facilitated their introduction throughout the Army.

Substantial assistance was rendered to psychological officers during the early period of the work by Col. Pearce Bailey and Lieut. Col. Edgar King, of the staff of the Surgeon General. From the beginning of his service as Surgeon General of the Army psychological examining had the hearty and effective support of Maj. Gen. Merritt W. Ireland and his staff.

Among the many other officers who furthered in important ways this new variety of personnel service special mention should be made of Col. Henry A. Shaw, Brig. Gen. E. L. Munson Col. Roger Brooke, Brig. Gens. Robert I. Rees and R. J. Burt, and Col. W. D. Scott.

ROBERT M. YERKES,
Lieut. Col., U. S. R.

WASHINGTON, D. C.,
May 17, 1920.

NATIONAL ACADEMY OF SCIENCES

Volume XV

PSYCHOLOGICAL EXAMINING IN THE UNITED STATES ARMY

Part I

HISTORY AND ORGANIZATION OF PSYCHOLOGICAL EXAMINING

AND THE

MATERIALS OF EXAMINATION

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INTRODUCTION TO PART I.

The story of the introduction, development, and conduct of psychological examining in the Army is told with substantial completeness in this part of the report. Attempt has been made to indicate the novelty, practical success, and military value of the work and also to suggest the educational, industrial, and scientific significance of the methods which military demands brought into use. This official history begins with the inception of the idea of the psychological classification of recruits and ends with the termination of the military emergency.

In order that all of the printed materials of military psychological examining shall be rendered permanently available, they are reproduced in this part of the report. Of primary value to the science of psychology are the forms of the Examiner's Guide.

In the preparation of Part I of the report the Chief of the Division of Psychology was assisted editorially by Capt. E. G. Boring.

ROBERT M. YERKES,
Lieut. Colonel, U. S. R.

WASHINGTON, D. C.,
May 15, 1920.

PSYCHOLOGICAL EXAMINING IN THE UNITED STATES ARMY.

Part I.—HISTORY AND ORGANIZATION OF PSYCHOLOGICAL EXAMINING AND THE MATERIALS OF EXAMINATION.

HISTORY AND ORGANIZATION OF PSYCHOLOGICAL EXAMINING.

CHAPTER I.

PREOFFICIAL PERIOD OF PREPARATION FOR NATIONAL SERVICE.

On April 6, 1917, in connection with a meeting of a group of experimental psychologists which was at that time being held in Emerson Hall, Cambridge, Mass., a session was arranged by Messrs. Langfeld and Yerkes, with the approval of the chairman of the meeting, Mr. Titchener, for discussion of the relations of psychology to national defense. Capt. W. S. Bowen, instructor in military science and tactics, Harvard University, attended this meeting and made valuable suggestions concerning the possible rôle of psychology. At the conclusion of the discussion it was moved by Mr. Warren that a committee, consisting of Messrs. Yerkes, Bingham, and Dodge, be appointed to gather information concerning the possible relations of psychology to military affairs and to further the application of psychological methods to military problems.

On the evening of the same day at an informal conference of the members of this committee (Mr. Bingham's place was taken by Mr. Ogden) it was decided that the matter should be placed before the council of the American Psychological Association, so that the national organization rather than any restricted or local group might take action. Following this conference the president of the American Psychological Association prepared the following letter, which, on April 7, was dispatched to the members of the council of the association:

EMERSON HALL,
Cambridge, Mass., April 6, 1917.

To the Council of the American Psychological Association.

GENTLEMEN: In the present perilous situation it is obviously desirable that the psychologists of the country act unitedly in the interests of defense. Our knowledge and our methods are of importance to the military service of our country, and it is our duty to cooperate to the fullest extent and immediately toward the increased efficiency of our Army and Navy. Formalities are not in order. We should act at once as a professional group as well as individually.

As president of the American Psychological Association I apparently have choice of two lines of action: Either I may recommend to the council that a special meeting of the association be called at once to consider the general situation, or I may, instead, ask the council to authorize the appointment by the president of such committee or committees from the association membership as seem desirable.

After consultation with a number of members of the association, I have chosen the second alternative, and I hereby request the council's authorization to appoint such necessary and desirable committee or committees.

The duties of any group or groups of members appointed to represent and act for us would evidently consist, first, in gathering all useful information concerning the varied aspects of the actual and possible practical relations of psychology to military affairs; second, to cooperate, as circumstances dictate with governmental agencies, with the National Council of Defense, with local psychological groups or individuals, and with such other agencies as may develop; third, to further the development and application of methods to the immediate problems of military selection.

Already many of us are working for national defense in our respective communities. It is my thought that this action by our council should, far from interfering with individual initiative, tend to unite us as a professional group in a nation-wide effort to render our professional training serviceable.

I urge you, gentlemen, to give this matter your immediate consideration, and I trust that you will write freely concerning your own activities, plans, and opinions, for your advice and suggestions concerning all aspects of the problem will be quite as welcome as your vote on the above recommendation.

Yours, faithfully,

(Signed) Robert M. Yerkes,
President, American Psychological Association.

It was deemed desirable by two members of the council that a meeting of the council be called immediately for consideration of the situation and decision concerning desirable action. Such a meeting was called by the president in Philadelphia for the evening of April 21.

In the meantime the president, in order to obtain pertinent information concerning actual and possible applications of psychology to military problems, and, by request, to advise the military hospitals' commission of Canada concerning the use of psychological methods, proceeded to the Dominion of Canada and made careful inquiry concerning psychological activities in Montreal, Ottawa, and Toronto. Information obtained from the Canadian authorities indicated the urgent desirability of the application of psychological methods in the selection of recruits and in the studying of incapacitated soldiers.

While in Ottawa a telegram was received from Dr. George E. Hale, chairman of the National Research Council, requesting a conference in Philadelphia on April 14. In accordance with this request the president of the association met Dr. Hale and briefly reported to him the action which had been taken by American psychologists and the results of observation in Canada. Chairman Hale requested that a psychological committee be organized in connection with the National Research Council and that the president of the American Psychological Association act as chairman of the committee, and as a member of the council. He further invited the president of the association to attend the semiannual meeting of the National Research Council in Washington, on April 19, as a representative of psychological interests.

At the special meeting of the council of the American Psychological Association, which was held on the evening of April 21 and the morning of April 22 in Philadelphia, the president of the association reported the action taken in Cambridge and the results of his observations in Canada. After thorough discussion of the relations of psychology to the military situation it was voted by the council that the president be instructed to appoint committees from the membership of the American Psychological Association to render to the Government of the United States all possible assistance in connection with psychological problems arising in the military emergency. Twelve committees were subsequently appointed. It was further voted that the secretary of the psychological association be instructed to communicate the action of the council to the members of the association and to suggest that individuals and institutions offer their professional services to the Government in suitable manner.

The council made certain suggestions concerning the presentation to the proper government authorities of a plan for the psychological examination of recruits and authorized the president to proceed with such presentation.

Following this council meeting, and by authorization already indicated, a psychological committee of the National Research Council was organized with the following membership: Messrs. Cattell, Hall, and Thorndike from the National Academy of Sciences; Messrs. Dodge, Franz and Whipple, from the American Psychological Association; and Messrs. Seashore, Watson, and Yerkes from the American Association for the Advancement of Science.[1]

At the first meeting of this committee it was voted—

that whereas psychologists in common with other men of science may be able to do invaluable work for national service and in the conduct of the war, it is recommended by this committee that psychologists volunteer for and be assigned to the work in which their service will be of the greatest use to the Nation. In the case of students of psychology this may involve the completion of the studies on which they are engaged.

It was the function of this general committee to organize and, in a general way, supervise psychological research and service in the present emergency. Problems suggested by military officers or by psychologists were referred by the committee to appropriate individuals or institutions for immediate attention.

[1] Subsequently Mr. Cattell resigned from this committee and Messrs. Angell, Baird and Scott were added to the membership.

Several of the committees originally appointed by the council of the American Psychological Association were subsequently accepted as subcommittees of the committee on psychology of the National Research Council.

After the meeting of the National Research Council which the president of the American Psychological Association attended in Washington, and at which he made a brief statement concerning the possible service of psychology to the military organizations, a circular letter was addressed to the members of the American Psychological Association in which their cooperation with the Government in the interest of national defense was suggested. It was indicated that psychological laboratories might be made available and that offers of personal service would materially assist the council in formulating and furthering plans for the development of national service.

During the last week in April, in pursuance of the suggestions of the council of the American Psychological Association, the president, acting as chairman of the committee on methods for the psychological examining of recruits, prepared for transmission to the proper military authorities a plan for the examining of recruits, in which the function of the psychologist in dealing with intellectual deficiency and psychopathic tendencies, and his limitation, as an assistant of the military medical examiner, to the purely psychological aspects of the work was emphasized. A definite proposal for the administration of the work of examining in the camps was made. Since the details of this proposal differ considerably from the plan that was finally adopted it is unnecessary to give them here.

Early in May this plan was submitted to the chairman of the National Research Council, who in turn referred it to the chairman of the committee on medicine and hygiene of the council, Dr. Victor C. Vaughan. With Dr. Vaughan's support and cooperation the plan was promptly placed before the Surgeon General of the Army.

The evident necessity for developing methods of psychological examining especially adapted to military needs stimulated the chairman of the committee on methods of examining recruits to seek such financial aid as should render possible the organizing of an active committee for this special task. About the middle of May this need and opportunity were brought to the attention of the committee on provision for the feeble-minded (Philadelphia), whose secretary, Mr. Joseph P. Byers, immediately presented the matter to his board. It was promptly voted by this organization to offer the committee on methods facilities for work at The Training School, Vineland, N. J., and to meet the expenses of the work to an amount not to exceed $500. This sum was later increased to $700. On the basis of this offer of assistance, a committee, consisting of Messrs. Bingham, Goddard, Haines, Terman, Wells, Whipple, and Yerkes, was assembled at The Training School, Vineland, N. J., on May 28. It remained in session until June 9 when it adjourned for two weeks to make trial of methods which had been devised.

During the first two weeks it was decided to arrange a method of examining recruits in groups of 25 to 50, as an initial psychological survey. The group method, as finally agreed upon and printed for preliminary trial, consists of 10 different measurements.

From June 10 to 23 the various members of the committee conducted examinations by the above method in several parts of the country. In all, about 400 examinations were made, chiefly upon United States marines and candidates in officers' training camps. These measurements were analyzed by the committee and used as a basis for revision and the devising of methods of scoring.

On June 25 the committee resumed its sessions at Vineland and continued its work until Saturday, July 7, when it adjourned, on the completion of tentative methods of group and individual examining. At this time the committee had in press five forms of group examination record blanks; an individual examination record blank, which provides special forms of measurement for illiterates, those who have difficulty with the English language, those who exhibit irregularities suggestive of psychopathic condition, those who are intellectually subnormal or inferior, and, finally, those who are distinctly supernormal; an examiners' guide, which contains directions for the conduct of examinations; and various types of special record sheet.

Before its adjournment the committee, through a joint committee of psychiatrists and psychologists, consisting of Drs. Copp, Meyer, Williams, Terman, Haines (Bingham, alternate),

and Yerkes, received assurance from the committee (National Committee for Mental Hygiene) on furnishing hospital units for nervous and mental disorders to the United States Government that this committee would finance to the extent of $2,500 the trial of the above methods of psychological examining in various army and navy organizations—the work to be so planned as to test thoroughly the reliability and serviceableness of the methods, and to supply materials for their improvement, and for the development of satisfactory methods of scoring and reporting data of examinations.

This offer of assistance resulted in the prompt formulation of the following plan, which was successfully carried out.

"Five groups of three men each are to be organized for immediate work in four different military establishments, each group to consist of a chief examiner and two assistants. The fifth group to be organized for statistical work.

"The four examining groups are to work for one month in naval stations, army reorganization camps, or officers' training camps. It is proposed that approximately 1,000 men be examined at each place by the group method and approximately 200 by the individual method; further, that, so far as possible, the results of these examinations be correlated with industrial and military records or histories.

"This work is to begin as soon after July 15 as possible. Records for examinations are to be shipped to the statistical unit in New York City as rapidly as possible, so that they may be scored and the results evaluated and correlated with a view to determining the best methods of scoring and desirable changes in methods of examining."

PERSONNEL OF UNITS.

Examining unit, Fort Benjamin Harrison, Indianapolis, Ind.: Chief examiner, G. M. Whipple, succeeded by T. H. Haines; assistant examiners, J. E. Anderson, W. K. Layton.

Examining unit, Camp Jackson, Nashville, Tenn.: Chief examiner E. K. Strong; assistant examiners, B. R. Simpson, D. G. Paterson.

Examining unit, reorganization camp, Syracuse, N. Y.: Chief examiner, J. W. Hayes; assistant examiners, J. C. Bell, W. S. Foster.

Examining unit, naval training base No. 6, Brooklyn, N. Y.: Chief examiner, R. S. Woodworth; assistant examiners, N. J. Melville, G. C. Myers.

Statistical unit: Statistician, E. L. Thorndike; assistants, A. S. Otis, L. L. Thurstone.

The examining of approximately 4,000 soldiers in accordance with the plan described above and the comparison of the results with officers' ratings of the men revealed a correlation of about 0.5, and in general justified the belief that the new methods would prove serviceable to the Army.

On July 20, after the adjournment of the committee on methods and as a direct result of its work, a substitute plan for the psychological examining of recruits was forwarded to the Surgeon General of the Army. This plan proposed the commissioning of six qualified experts, to be designated chief psychological examiners, each to be in charge of the work of a single camp, and the appointing, under the Civil Service Commission, of 18 men as assistant psychological examiners. It was pointed out that a list of available appointees had already been prepared. Specific recommendations for apparatus and equipment and for the mode of procedure in examining were also made. It was further submitted "that all recruits, on the results of the group examination, be tentatively classified as mentally (*a*) low, (*b*) high, (*c*) average, (*d*) irregular; and that as time permits the lowest 10 per cent, the highest 5 per cent, and irregular individuals shall be subjected to more searching individual examination."

Early in August report of the trial of methods of psychological examinations in army and navy stations was prepared and on the basis thereof it became possible definitely to recommend to the medical department of the Army official trial in the drafted Army of the methods prepared by the committee.

The chairman of the committee was, upon recommendation of Drs. Vaughan and Welch, of the National Research Council, appointed with the rank of major in the Sanitary Corps, National Army, to organize and direct psychological examining for the medical department.

CHAPTER 2.

THE OFFICIAL MILITARY TRIAL OF PSYCHOLOGICAL EXAMINING.

SECTION 1.—*Provision of professional personnel.*

The decision of the Surgeon General thoroughly to investigate the relations of methods of psychological examining to military needs was followed by systematic effort to discover suitable ways of providing the necessary professional personnel for psychological service in the Army. It was shortly discovered that the recently created Sanitary Corps offered opportunity for the military appointment of psychologists. The Surgeon General decided that for preliminary trial of psychological methods, a number not to exceed 16 qualified psychologists might be recommended for appointment in the grade of first lieutenant in the Sanitary Corps, National Army.

It seemed desirable, however, to secure the services of psychologists under civil appointment, in order that the necessity of commissioning a relatively large number of men for this service should be avoided until the practical value of the methods had been demonstrated. The chairman of the committee on psychology of the National Research Council acting under the direction of Maj. Pearce Bailey, responsible head of the work in neurology and psychiatry in the Surgeon General's Office, proceeded to investigate for the Surgeon General the possibilities of civil appointment. His inquiries led to the preparation of the following letter:

AUGUST 3, 1917.

From: The Surgeon General.
To: The Secretary of War.
Subject: Eligibles for employment as psychological examiners.

1. It is respectfully requested that the Secretary of War obtain from the Civil Service Commission, in accordance with the needs and qualifications stated herein, a list of eligibles for the position of psychological examiner in the Army.
2. These men are needed to serve as expert psychological examiners under the direction of medical officers, to the end that a "first line" army may be organized speedily.
3. The requirements for appointment are thorough training in psychology and special training and experience in the use of methods of psychological examining. Men holding the degree of Ph.D. in psychology or of M. D., or both, who are professionally engaged in psychological work, are to be preferred.
4. The work will be done in the military camps under the direction of officers of the medical department detailed to supervise this work of examining and classifying according to ability.
5. The period of employment probably will not exceed six months.
6. Eighteen men are needed for immediate service. More may be required later.
7. The salary should be at the rate of $2,400 per annum.

W. C. GORGAS,
Surgeon General, United States Army.

[First indorsement.]

War Department, August 7, 1917.—To the Civil Service Commission.

The department requests authority for appointment without competitive examination unless the commission has a register of eligibles available for these temporary positions.

JOHN C. SCOFIELD,
Assistant and Chief Clerk.

AUGUST 15, 1917.

The honorable the SECRETARY OF WAR.

SIR: In compliance with the department's request of August 7, indorsed on the Surgeon General's recommendation of August 3, the appointment of 18 or more men as expert psychological examiners, at $2,400 per annum under the Surgeon General of the Army, is hereby authorized under section 4 of Civil Service Rule VIII, which provides for job employment, as the probable period of employment is mentioned as not more than six months.

By direction of the commission:

Very respectfully,

I. I. MCILHENNY,
President, Civil Service Commission.

[First indorsement.]

War Department, August 25, 1917.—To the Surgeon General.

AUGUST 20, 1917.

Memorandum for the Surgeon General:
Subject: Psychological examiners.

With reference to the communications herewith, the Secretary of War directs me to inform you that, due to lack of data as to the exact nature of the duties to be performed by the proposed psychological examiners, he is unable to act upon your recommendations. Information should be furnished as to the plan of employment of the personnel, the necessity therefor, and the basis which fixes the number required.

TASKER H. BLISS,
Major General, Acting Chief of Staff.

AUGUST 21, 1917.

From: The Surgeon General of the Army.
To: The Chief of Staff.
Subject: Psychological Examining.

Relative to your inquiry of August 20 for information concerning psychological examining, I desire to offer the following:

1. It is deemed important that a special method of psychologically examining recruits which has been prepared under the direction of Maj. R. M. Yerkes for the detection of mental defectives be used.

2. The psychological examining must be done by special examiners, who will work under the direction of the medical staff, and whose results will supplement those of the physical examiner.

3. Until the value of the methods has been definitely established by Army use it appears desirable to authorize psychological examining in only four National Army cantonments. Thus far, under the authority of commanding officers in various camps, about 4,000 men have been examined by volunteer workers. The results correlate highly with officers' judgments of their men and justify the further and official trial of the new psychological examining.

4. The general plan of work, and staff organization for each cantonment are briefly described in the accompanying memorandum prepared for your information by Maj. Yerkes.

5. It is not anticipated that the services of contract psychological examiners will be required for more than four months in any single cantonment.

6. It is further provided that if after the first four weeks of work the reports are not satisfactory, psychological examining may be discontinued and the examiners discharged.

7. A few psychologists are being recommended for commissions in the Sanitary Corps. These men will organize and direct the examining in the cantonments. In each cantonment either four or five contract employees are needed to assist the commissioned psychologist. There are therefore needed for immediate use 18 civil-service appointees.

W. C. GORGAS,
Surgeon General, United States Army.

Approved August 23, 1917.
(Signed) NEWTON D. BAKER,
Secretary of War.

[First indorsement.]

War Department, A. G. O., August 24, 1917—To the Surgeon General.

Inviting attention to the approval of the Secretary of War indorsed hereon, and with the request that he recommend the cantonments in which he wishes to begin, and the form of instruction to be given the cantonment commander.

By order of the Secretary of War:

H. G. LEONARD,
Adjutant General.

[Second indorsement.]

War Department, S. G. O., September 1, 1917—To the Adjutant General.

It is recommended that the following instructions be given to the division commanders at Camp Lee, Va., Camp Taylor, Ky., Camp Dix, N. J., and Camp Devens, Mass.:

1. A staff of 10 psychological examiners, either as first lieutenants of the Sanitary Corps or civilians employed by the Civil Service Commission, will report to you, prior to October 5, 1917, for the purpose of conducting psychological examinations of enlisted men.

2. Arrangements will be made to conduct the examination of six companies per day (if double companies, 250 men, otherwise a corresponding number of men), four days per week—Monday, Tuesday, Thursday, and Friday. In this way a regiment will lose not more than two days from work and the company not more than one day. It is not intended that headquarters, supply, and machine-gun companies shall be examined.

3. It is believed that suitable rooms for the examination can be found, either at the hospital wards, barracks rooms, or other large buildings.

4. The method of examination will be substantially as follows: Six psychological examiners with their assistants will work simultaneously in different rooms. At 8 a. m., or thereabouts, company shall be reported in sections of not

more than 80 men (two sections for regular companies, three sections for companies of 250 men) to the examining rooms. Each company section should report in charge of a commissioned officer, who should remain to assist with the examination, and should detail a sufficient number of noncommissioned officers to be distributed among the group to keep order and assist in carrying out instructions of the examiner.

5. It is desired that the psychological examiner have interviews prior to the examination of organizations with the commanding officer of the organization in order to explain to him the methods and objects of the examination.

6. The following clerical assistants detailed from enlisted men will be needed: (1) Two men to prepare typewritten examination lists and reports; (2) 50 men to serve as scoring clerks four mornings a week, from 8 to 12 o'clock; (3) 20 men to serve as scoring clerks four afternoons a week, from 1 to 5 o'clock; (4) 12 men to serve daily as copying clerks for the keeping of individual record cards.

7. It is not planned to conduct examinations on Sunday. It is expected that the work will be completed within six weeks.

8. As this work has been carefully considered and planned, and as it is believed to hold possibilities of great good for the service, it should be expedited and assisted in every possible way consistent with the general interests of the service.

H. P. Birmingham,
Colonel, Medical Corps.

[With this indorsement a detailed program for psychological examining was submitted. The object of the work, the specific functions of the personnel, and a daily schedule for the reporting of men from companies were included.]

[Third indorsement.]

War Department. S. G. O., September 4, 1917—To the Adjutant General of the Army.

1. Requested that necessary orders and instructions be given to the cantonment commanders as given in the second indorsement hereon.

C. L. Furbush,
Major, Medical Reserve Corps.

[Fourth indorsement.]

War Department, A. G. O., September 6, 1917—To the Surgeon General.

With the information that copies of the second indorsement have been transmitted to the commanding general, eightieth division, Camp Lee, Va.; the commanding general, eighty-fourth division, Camp Taylor, Ky.; the commanding general, seventy-eighth division, Camp Dix, N. J.; and the commanding general, seventy-sixth division, Camp Devens, Mass., for action as recommended in that indorsement.

By order of the Secretary of War:

John S. Johnston,
Adjutant General.

From August 17, 1917, Maj. Yerkes acted for the Surgeon General as responsible head of psychological work, which was at first administered in connection with the neurological and psychiatric service.

As soon as the Surgeon General had decided to make trial of psychological methods, plans for the conduct of camp surveys were prepared, examining equipment and printed materials were ordered, and necessary provision was made for the prompt and efficient conduct of the work.

PSYCHOLOGICAL STAFFS OF CANTONMENTS.

At Maj. Yerkes' request 24 psychologists were appointed as civilian examiners. Simultaneously 16 men were recommended for appointment as first lieutenants in the Sanitary Corps. The stations at which these several military and civil appointees reported are indicated below:

Camp Lee, Va.: First Lieuts. Clarence S. Yoakum (chief psychological examiner), George O. Ferguson, jr., Walter S. Hunter, Edward S. Jones, and the following civilians: Leo J. Brueckner, Donald G. Paterson, Austin S. Edwards, Rudolph Pintner, Benjamin F. Pittenger, Ben D. Wood.

Camp Taylor, Ky.: First Lieuts. Marion R. Trabue (chief psychological examiner), Karl T. Waugh, Heber B. Cummings, Edgar A. Doll, and the following civilians: James W. Bridges, J. Crosby Chapman, John K. Norton, Eugene C. Rowe, J. David Houser, Calvin P. Stone.

Camp Dix, N. J.: First Lieuts. Joseph W. Hayes (chief psychological examiner), Harold A. Richmond, Herschel T. Manuel, Carl C. Brigham, and the following civilians: Thomas H. Haines, Norbert J. Melville, Howard P. Shumway, Thomas M. Stokes, John J. B. Morgan, Charles C. Stech.

Camp Devens, Mass.: First Lieuts. William S. Foster (chief psychological examiner), John E. Anderson, Horace B. English, John T. Metcalf, and the following civilians: Raymond H. Wheeler, Harold C. Bingham, Carl R. Brown, Chester E. Kellogg, Ralph S. Roberts, and Charles H. Toll.

The section of Psychology within the Division of Neurology and Psychiatry was organized during November, with the following staff: Maj. Robert M. Yerkes, S. C., N. A., in charge of section, appointed August 17, 1917; Lieut. Arthur S. Otis, statistician, appointed October 3, 1917; Dr. Lewis M. Terman, appointed advisory member October 18, 1917; Capt. Charles Scott Berry, appointed November 21, 1917.

SECTION 2.—*Conduct of examining in cantonments.*

The progress of psychological work in the stations in which it was first tried and certain of the most important conditions affecting it are indicated below:

Camp Devens.—Beginning September 16, 1917, the psychological staff, which was quartered in the base hospital, worked with the personnel officer of the camp for the double purpose of assisting him and of gaining insight into the methods and results of the qualification card system. The chief psychological examiner was advised on September 19 by the division surgeon that it would be unwise to attempt to initiate psychological examining until at least 40 per cent of the soldiers expected in the camp had been assigned to organizations. It was further stated that this would probably delay examining until October 15.

During the last week of September examinations were made for the training of the staff The following week certain preliminary investigations were conducted in compliance with directions from the Office of the Surgeon General. The purpose of these investigations was to perfect methods and to secure tentative norms. Numerous conferences were held early in October to acquaint the officers of Camp Devens with the methods and purposes of the psychological service.

On October 15 psychological survey of the camp was initiated by the examination of 475 men. The following day 1,000 men were examined. A conference with company commanders was held on October 17 and thereupon, in order that psychological records might be scored promptly and the results properly reported to medical and line officers, about sixty enlisted men were assigned to the psychological staff for clerical duty.

During the first week of the survey work, one regiment was examined. Each company was taken in two sections. The average number of individuals per section was 100. The staff at this time experienced difficulty in making the requested number of individual examinations. During the second week of the survey, increase of the force of scoring clerks to 90 made possible the examination of three regiments.

On November 9 a total of 14,091 men had been examined, and on November 20 the total had reached 20,085.

Maj. Yerkes reported at Camp Devens on November 22 for inspection of psychological examining and conference with the commanding general concerning the feasibility and desirability of examining the officers of the camp.

Satisfactory arrangements were promptly made for the examination of officers, and on November 26 this work was initiated by the examination of 180 medical, dental, and veterinary officers. On November 28 it was reported by the chief psychological examiner that 830 officers had been examined. On the same date a total of 1,059 individual examinations was reported. From this group of cases about 200 had been referred to the neuro-psychiatric officer for special examination.

As the survey of the camp was well advanced, the attention of the staff was directed early in December to special study of the military status, prospective value to the service, and general behavior of men who received unsatisfactory grades in the psychological examination. Effort was made to ascertain the attitude of company commanders, as well as of regimental and other officers, toward the psychological service. To this end a simple questionary was sent to each officer.

Official report of December 6 gives the following totals for groups examined: Enlisted men, 18,021; officers, 1,197; individual examinations, 1,148.

From this time the strength of the psychological staff was rapidly reduced because of needs elsewhere, and attention was devoted primarily to the preparation of reports on special aspects of methods and results and to the completion of the study of the status and military value of men reported as "E" (mentally low grade) or as "m" (medical attention) cases. Lieut. Wm. S. Foster, chief psychological examiner, was ordered to the Office of the Surgeon General, Washington, on December 13, for special duty in connection with the revision of methods and Lieut. John E. Anderson was designated acting chief psychological examiner in his place.

In all approximately 20,000 soldiers were examined at Camp Devens between October 15 and December 1. The work was facilitated in every possible way by the commanding generals, the division surgeon, and the commanding officer of the base hospital; but it was nevertheless conducted under seriously adverse conditions which at once lessened its value to the division and made it extremely difficult for the psychological staff.

Psychological service in this camp was officially inspected for the medical department late in November by Col. Henry Alden Shaw, M. C.

Camp Dix.—Although the psychological staff reported for duty at Camp Dix late in September, 1917, survey of the camp could not be initiated until late in November. This delay was due to the desire of the commanding general to have organizations brought to full strength before being examined and to the delay in the completion of the hospital wards in which the examinations were to be made. During November, while awaiting the opportunity to make examination of all available soldiers, the psychological staff busied itself with individual examining, with efforts to perfect methods, and with the intensive study of a single regiment—the Three hundred and third Engineers. Nine days were devoted to this organization alone, and, as a result, exceptionally detailed and valuable reports were made to the Surgeon General.

The first week of December Maj. Yerkes reported at Camp Dix to inspect psychological work. At this time almost no examinations had been made aside from individual cases and the Three hundred and third Engineers. Arrangements were then made, with the approval of the commanding general of the division, for the immediate examination of officers. All those below the rank of field officer were ordered to report for examination, and the remainder were invited also to attend.

On December 15 the chief psychological examiner, Lieut. Joseph W. Hayes, reported that 1,151 officers had been examined, and in addition 5,462 enlisted men. There were in the camp at this time 19,000 soldiers.

Between December 10 and December 22, when suitable facilities for examining had been secured, the psychological survey was rushed. More than 160 groups were examined and the number of examinations per day reached 1,500. By January 1, 1918, about 14,000 men had been examined in this camp.

Apart from the unfortunate delay of examining at Camp Dix, conditions were favorable to the service.

Both the division surgeon and the commanding officer of the base hospital exhibited keen interest in the work and effectively facilitated it. The delay of the general survey until organizations were well filled undoubtedly greatly lessened the value of psychological reports to company commanders. Consequently the results obtained in this camp are not of comparable significance with those obtained in Camp Devens.

Camp Lee.—From the very first the psychological service succeeded in Camp Lee. The success was due in the main to the appreciation of the possible value of psychological examining by the division surgeon, the commanding officer of the base hospital, and the commanding general of the division. There was practically no delay in the initiation of work and the survey of the camp was completed according to schedule.

Examining was initiated most fortunately on officers. On September 30, 1917, all regimental medical officers were ordered to report for psychological examination, and the following week practically all officers of the division and camp took the examination. The psychologists were

requested to examine all nurses at the base hospital and to make comparison of the psychological ratings of the 50 best and the 50 poorest men in each of several companies.

By the middle of October the survey of enlisted men was progressing rapidly; as many as 1,100 were given group examination in a single day. When, on November 5, the work of this camp was inspected by Maj. Yerkes, the organization of the staff, its relations to the activities of the medical department, to the personnel office, and to the headquarters staff, were eminently satisfactory and in all directions work was progressing rapidly and with maximal serviceableness.

One member of the psychological staff was detailed during November to serve with the psychiatrists of the division in order that cases requiring intelligence examination might be reported on promptly. The chief psychological examiner, primarily for educational purposes, held many conferences with regimental and company officers as well as with officers of the staff and members of the Medical Corps. The need was early recognized in this camp for the organization of service battalions, to which might be referred men of very low grade intelligence who, although undesirable for regular military service because of slowness in learning, might yet be used to advantage as common laborers.

The survey of this camp had been practically completed by December 1 and except for the uncertainty concerning the future conduct of psychological work the greater part of the staff would have been transferred at once to some other station.

The total of examinations in Camp Lee to December 8, 1917, was 31,520. This covers the examination of 1,317 officers, 19,913 white enlisted men, and 3,285 negro enlisted men. Individual examination was made of 339 men. When the psychological survey in Camp Lee was progressing at maximum speed, approximately 5,000 men were examined each week.

In this camp the division surgeon appreciated the possibilities of improving his service by obtaining reliable information concerning the professional training, the intellectual ability, and the military value of every individual. He therefore developed a qualification card on which the several important bits of information might be recorded and, with the assistance of the personnel officer and the chief psychological examiner, made systematic study of the medical officers of the camp. This information was later used most effectively for purposes of reorganization. Incompetent officers were tried out in new positions in order to discover whether they were misfits or all-round incompetents. Many were transferred, some discharged, and the divisional medical service was markedly improved. The commanding general of the division also took pains to inquire into the possible values of ratings of officers and enlisted men. His sympathetic and intelligent interest in the work of the personnel bureau and of that of the psychological staff facilitated these lines of inquiry and rendered their results unusually valuable to the division.

Col. Henry Alden Shaw, M. C., officially inspected psychological service at Camp Lee on November 7, 1917.

Camp Taylor.—The commanding officer of the base hospital, Camp Taylor on September 27, 1917, assigned seven wards to the psychological staff for conduct of its work. During the next two weeks necessary equipment was secured and installed. On October 29 the chief psychological examiner, Lieut. Marion R. Trabue, in conference with the commanding general of the division endeavored to secure the assignment of enlisted men to serve as clerks. It developed in connection with this conference that the commanding general had never seen the official instructions concerning psychological examining issued by The Adjutant General of the Army. Search failed to reveal a copy of these instructions in the camp. Telegraphic request for same was therefore sent to The Adjutant General. This miscarriage of information cost the psychological staff nearly two weeks. It was not until November 15 that group examining was arranged for, and even then, instead of arrangements in accordance with the program of the Office of the Surgeon General, the psychological staff was instructed by camp authorities to examine men in connection with the Tuberculosis Board. Subsequently Maj. Yerkes, in connection with inspection of psychological examining at Camp Taylor, succeeded in arranging with the commanding general for the conduct of examinations in accordance with the

program followed in the other camps. Thereafter several companies were given group examination each day. The largest number examined in a single day was 1,700 on November 22.

Early in December the officers of this camp were examined, and before Christmas the survey of organizations of the division was completed. To January 1, 1918, approximately 17,000 enlisted men and 1,274 officers had been given psychological examination.

SECTION 3.—*Special investigations and reports from examining stations.*

In each of the four National Army cantonments where psychological examining was originally tried, the staff conducted special investigations as opportunity offered, for the purpose of improving and standardizing methods and of securing reliable bases for the evaluation of results. Results of these investigations were promptly reported to the Surgeon General so that the data received from the several stations might be compared and used to advantage for the improvement of procedures.

It is impracticable in connection with this historical statement to attempt a summary of these reports or even a list. Be it said, however, that it was this work and the spirit which prompted it that rendered possible the development and the final stabilization of methods. The actual examining of soldiers in the cantonments occupied not more than half of the time of most members of the staff. The remainder they devoted systematically to work, the importance of which for the Army was doubtless greater even than the examining of thousands of men. These 40 psychologists, who worked early and late under conditions which were almost invariably trying and sometimes utterly discouraging, deserve unlimited praise for the quality and amount of the original work which they did over and above the performance of their routine duties.

During this period of trial examining approximately 100,000 men were reported on. The total of group and individual examinations, since many individuals were given two or three examinations, approached 200,000. At the same time there were received from Camp Devens, 36 special reports; from Camp Dix, 30; from Camp Lee, 32; from Camp Taylor, 11.

SECTION 4.—*The relations of psychological examining to classification of personnel in the Army.*

In August, 1917, a committee on the classification of personnel in the Army was organized to engage, under the direction of The Adjutant General, in the development and application of methods suitable for classifying soldiers in accordance with occupation, and in the preparation of a reliable classification of enlisted men and commissioned officers. The information which this committee gathered was recorded on a "qualification card." It soon became evident that the "intelligence rating" of a soldier may be of great importance in connection with assignment to military duty. The committee therefore made provision on its qualification card for brief statement of the result of psychological examinations.

In view of the obvious relations of the psychological service to the work of the Committee on Classification of Personnel on the one hand, and to that of the Division of Neurology and Psychiatry of the Medical Department on the other, the following recommendations concerning the conduct of the psychological service were made by the chief of the Section of Psychology after conference with Majs. Bailey and Salmon, of the Office of the Surgeon General, and with their hearty approval:

NOVEMBER 5, 1917.

From: Maj. Robert M. Yerkes.
To: The Surgeon General, U. S. Army.
Subject: Plans for conduct of psychological examining.

1. The psychological examining as conducted at present has two immediate references—(*a*) military, (*b*) medical

2. It appears logical and in a variety of respects desirable that the portion of the work which has purely military significance be done under The Adjutant General and in connection with the personnel committee; that the medical portion of the work be done under the immediate supervision of the psychiatric boards.

3. It is therefore recommended that this department request the personnel committee of the War Department to provide in its organization for the psychological examining of enlisted men as they report in the draft and for such examining of officers as is requested.

4. The accompanying plan and diagram indicate the relations which would be established in case the above recommendations were adopted by the Medical Department.

5. This plan is especially recommended because a large part of the information gained in the psychological examining must in any event be referred immediately to the personnel office, whereas only a few individuals examined are strictly medical problems.

ROBERT M. YERKES,
Major, Sanitary Corps.

[The plan referred to outlined specifically a feasible mode of assignment of personnel under the two alternative conditions, viz: (*a*) With all work organized under the Medical Department; (*b*) with work divided between the Medical Department and The Adjutant General's Office.]

[First indorsement.]

WAR DEPARTMEMT, S. G. O.,
November 7, 1917.

To The Adjutant General of the Army:

Referring the above plans for conduct of psychological examining to The Adjutant General with request that they be considered by the Committee on Classification of Personnel of the Army and that the Medical Department be advised concerning them.

W. C. GORGAS,
Surgeon General, United States Army.

The matter was referred to the committee on classification of personnel in the Army. The replies follow:

NOVEMBER 14, 1917.

From: Walter Dill Scott.
To: Surgeon General of the U. S. Army.
Subject: Plans for conduct of psychological examining as presented in letter from Maj. Yerkes, November 5, 1917.

1. The psychological examining is now being carried forward in Camps Devens, Dix, Lee, and Taylor. Reports of this work are not as yet complete. Personally I am convinced of the value of this work, and beg to assure you that the committee will be glad to give careful consideration to the plan proposed by Maj. Yerkes as soon as reports have been secured from the cantonments regarding the usefulness of this work in organizing the divisions.

WALTER DILL SCOTT,
Director, Committee on Classification of Personnel.

DECEMBER 8, 1917.

From: The Committee on Classification of Personnel in the Army.
To: The Surgeon General, U. S. Army.
Subject: Extension of psychological testing in the division.

In response to Gen. Gorgas's letter of November 12 and in elaboration of W. D. Scott's letter under date of November 14, and in response to the request of Maj. Yerkes, the following resolution was voted unanimously by the committee:

The Committee on Classification of Personnel in the Army believes that the interests of The Adjutant General's Department and of the Surgeon General's Department would best be served by permitting the committee simply to continue its hearty cooperation with the Surgeon General's Department in developing psychological tests and in making use of the results of the tests.

The committee respectfully begs leave to call to the attention of the Surgeon General the advisability of extending the work of psychological testing to all the Army cantonments. The results of such testing, if obtained within 48 hours of the recruits' arrival in camp, would be of decided value to The Adjutant General's Office in classifying the enlisted men.

WALTER DILL SCOTT,
Director of the Committee.

SECTION 5.—*Official inspection of psychological examining.*

On the basis of careful study of psychological examining in Camps Devens, Dix, Lee, and Taylor, Maj. Yerkes from time to time made report to the Surgeon General on the progress, status, and significance of the work. These statements were made usually in connection with regular daily or weekly reports or as reports of special detail. Since they obviously demanded confirmation or correction as well as supplementation by a regular medical inspector, the chief of the Section of Psychology requested in November, 1917, that a medical officer be ordered to inspect psychological examining in Camps Lee and Devens. These stations were selected because in them work was furthest advanced. Thus, as soon as the status of the service justified it, the first step was taken toward decision concerning the future of psychological examining in the Army.

Official inspection of the service was made during November by Col. Henry Alden Shaw, M. C. His report on Camp Lee is reproduced in full below because it proved to be of the greatest importance to the service. Maj. Yerkes was informed that Col. Shaw's observations at Camp Devens were wholly confirmatory of the statements and recommendations contained in the Camp Lee report and that for this reason detailed official report was not prepared.

NOVEMBER 16. 1917.

From: Col. Henry A. Shaw, M. C.
To: The Surgeon General, U. S. Army.
Subject: Psychological tests, Camp Lee, Va.

1. Pursuant to instructions from the Secretary of War dated War Department, Washington, November 5, 1917, I proceeded to Camp Lee, Va., November 7 and reported to the commanding general.

I. GENERAL STATEMENT.

2. Camp Lee is one of the four divisional cantonments selected by the War Department to try out certain psychological tests upon drafted men. Lieut. Yoakum, Sanitary Corps, N. A., had been placed in charge of this work as chief psychological examiner and reported for duty on September 18, 1917, under direction of the division surgeon, Lieut. Col. Thomas L. Rhoads. After familiarizing himself with the purposes and methods of the examinations, Col. Rhoads directed that the tests be first made upon all medical officers in camp. The results were quite remarkable, as they corroborated in a striking way the estimates of these officers already formed by the division surgeon and his personal staff. In his own words, "we found that those (medical officers) who had made the higher marks in the psychological tests were the very ones who had been doing good work, developing their infirmaries, making careful recruit examinations and complying with instructions, while those who had received the lower rating had not been doing as good work."

3. In view of the important bearing of this work upon the question of rating and promotion of officers, Col. Rhoads decided to take up the whole matter with the commanding general. To that end a conference was arranged, at which Lieut. Yoakum was present. Gen. Cronkhite was so favorably impressed with the results that had been obtained by the examination of the relatively few medical officers that he determined to have the tests applied to the entire commissioned personnel of the division.

II. THE PURPOSE OF THE TESTS.

4. The purpose of these tests has been outlined by Maj. Robert M. Yerkes, S. C., Chief of the Section of Psychology, Office of the Surgeon General, as follows:

(*a*) To aid in segregating and eliminating the mentally incompetent.

(*b*) To classify men according to their mental ability.

(*c*) To *assist* in selecting competent men for responsible positions.

III. METHODS OF EXAMINATION.

5. Very briefly the scheme for examination is as follows:

(*a*) The men are assembled at 8 o'clock a. m. by companies in unoccupied wards of the base hospital, reporting in groups of from 80 to 130 to one of three psychological examiners. Three groups are thus handled simultaneously and half a regiment is disposed of each morning.

(*b*) Each recruit is given a form (copy inclosed) for the group intelligence examination and is directed to fill in the information at the top of the sheet. This first test determines whether or not he is illiterate, and thus accomplishes the object of the literary test (copy inclosed), which has in consequence been abandoned.

(*c*) Men who are unable to fill in the headings on their forms are at once taken out of the group and sent to the room arranged for the mechanical skill test. The remainder of the group continue with the intelligence examination for three or four prescribed tests when a recess for a few minutes is announced, during which the examiner and his assistants pick out those men who are showing evident nervous or mental disturbance as a result of the strain of the ordeal. This procedure was adopted by suggestion of Maj. Moore, consulting neurologist of the hospital, with a view of segregating as quickly as possible cases of doubtful mental and nervous stability. Suspected cases are sent at once to the neurologist for special examination; the rest of the group finish the intelligence test. Three groups of men are thus handled by each of the three examiners between 8 o'clock and 11, or a little later, the intelligence examination proceeding simultaneously with the mechanical tests.

(*d*) The papers are scored in the afternoon or on the day following. Recruits who have been rated in the E class (receiving less than 80 points out of a possible 414) return for a special individual examination to determine their mental age. The scoring is done by 40 men and their work carefully supervised and checked. It is purely mechanical, being accomplished by an ingenious series of stencils made to fit over each form, showing at a glance the proper answer to the questions, so that nothing is left to the personal equation of the scorer.

(*e*) As a result of the tests, a report (form inclosed) is made by the chief psychological examiner to the company commander showing the rating of each man on the following scale: A, very superior; B, superior; C, average; D, inferior; and E, very inferior. The total number in each class is shown, as well as the number of illiterates. All men in the E class and all in the S class (illiterates who have taken the mechanical-skill test) are at once reported to the neurologist for special examination.

(*f*) These tests have been so systematically and expeditiously carried out and have been conducted with so little interference with routine company and regimental duties that I heard not one word of criticism on this score. The commanding general remarked to me that the time lost was neglible, and added that if the examination took 10 times as long, he would still be in favor of it.

(*g*) Regular psychological examinations began on October 8; up to November 10, 1,182 officers and 22,226 men (white) had been examined, more than 90 per cent of the white strength of the command, in numbers ranging from 1,083 to 6,633 each week.

IV. RESULTS OF THE TESTS.

6. Viewed from the standpoint of the purpose of the tests, the results may be outlined as follows:

A. Identification of the mentally incompetent:

(*a*) All men rated in the E and S classes have been carefully examined by Maj. Moore, consulting neurologist at the base hospital. A complete report of these cases is not yet available, but it is reasonably certain that about one-half of the E class and somewhat less of the S class will be found disqualified for military service; and it is probable that further observation and longer service of these men will result in further discharges for disability.

(*b*) It is recognized by both the psychologist and the psychiatrist that these tests do not discover certain not uncommon neurotic types. To assist in bringing these cases to light Maj. Moore has circulated the following bulletin among company officers:

The personality traits named below are of such importance as to be indicative of possible underlying mental conditions. Line officers are requested to refer to the psychiatrist recruits under their observation who exhibit them. These traits are: Irritable; seclusive; sulky; depressed; shy; timid; overboisterous; sleepless; persistent violators of discipline; "queer sticks" (cranks); "goats" (butts of practical jokes); "boobs" (those who have difficulty in comprehending orders); dull; stupid; marked emotional reaction (such as vomiting and fainting at bayonet drill); peculiarities of attitude, speech, or behavior sufficiently marked to attract attention of associates; those resentful of discipline; suspicious; sleepwalkers; bed wetters; those persistently slovenly in dress; those who have difficulty in executing muscular movements in setting-up exercises; those who are generally restless.

B. Classification according to mental ability:

(*a*) The testimony of unprejudiced officers is to the effect that in most instances the ratings given by the psychologist are confirmatory of the estimates found after frequent and intimate observation. The testimony of the division surgeon has already been quoted. Col. Rhoads had occasion recently to estimate the qualifications of about 30 officers in his department. To assist him in this work, he called into conference Maj. Schmitter, Maj. Carter, and Maj. Williams. The findings were closely in accord with the ratings as given by the psychologists.

(*b*) I took occasion to interview certain line officers who had been furnished psychological ratings of their men. There was a general agreement that these ratings corresponded in most instances with estimates previously formed as to the mental capacity of the men. Those at the top of the list correspond closely with the noncommissioned officers, company clerks, and other men of more than average ability, while at the bottom the list invariably showed many of the indifferent, stupid, and intractable men of the company.

(*c*) Maj. Carter, division sanitary inspector, who has had unusual opportunities to measure up the mental capacity of medical officers of the camp, says:

"Relative to my observations of the psychological tests, I wish to say that the ratings awarded to the men conform very closely to my personal estimation of the men examined."

(*d*) Maj. Williams, M. R. C., assistant to the division surgeon, believes that with the assistance given by the psychological tests "battalion and organization commanders can quicker give ratings and opinions on medical officers."

(*e*) Maj. Schmitter, commanding the base hospital, is firmly convinced of the value of the test as an aid in sizing up the capabilities of his men. He told me of a number of instances where the psychological scores gave an accurate index as to practical worth. Nearly all of the 200-odd men in his detachment were new to him and their records unknown. When the report of the psychological examiners came in he noticed that the man who had been given the highest rating had been sidetracked in the assignments and had been detailed to some very insignificant duty. He sent for this man, questioned him as to his previous training, and then placed him in a position of considerable responsibility. The recruit immediately made good and fully justified Maj. Schmitter's faith in him and in the trustworthiness of the psychological rating. Some time previous to this occurrence Maj. Schmitter's attention had been called to a young man of excellent appearance and address and apparently better educated than the ordinary soldier. He decided to make him a corporal. Soon after this man got into serious trouble, left his post of duty, and involved himself in all sorts of difficulties. When the psychological ratings came in it was found that his score was 81, far below the noncommissioned-officer grade, and almost approaching the feeble-minded. Further acquaintance with this man showed that, in Maj. Schmitter's words, he was an out-and-out "bonehead."

C. Selection for responsible positions:

(*a*) Observations in this line are illuminating, and although, with one exception noted in the last paragraph, men have not been selected, so far as I know, for important jobs solely by reference to their psychological scores, many instances have occured where men so selected were found to stand high on the psychological lists. A division order was recently issued requiring each company to report its best 50 men and its poorest 50; in most instances the individuals on these lists corresponded very closely with the highest and lowest of the psychological scores. As one captain expressed it, "We believe there must be something in these tests because they agree with our estimates of our men";

and it is said that Gen. Cronkhite has suggested that the reports of company commanders (on the 50 best and 50 poorest men in their companies) when checked with the psychological scores will furnish a vaulable index as to the officers' ability to size up men.

(b) The following instances have been reported as showing the concurrence of high mental rating with proved military capacity:

The headquarters troop at Camp Lee is a selected group. In the tests they all scored high in comparison with other companies. In order to prevent unfairness to some of these men when it came time to select men for the third officers' training camp, it was ordered that a number of them be distributed over the camp to other companies and organizations. One of the officers of this troop requested the scores of these men in order to check the men selected for this distribution with their scores. He reported to us, after going over the list, that the 15 men selected because of their excellent chances for the training camp were at the top of our list of scores ranked in accordance with the mental capacity indicated by the tests.

About 15 promotions to noncommissioned ranks appeared in the local newspapers one morning. The score of each of these men was looked up. It was found that every man in the list had a score which would have justified the promotion so far as mental capacity is concerned. At the personnel office we find similiar confirmations. The correlation here can not be expected to be exact, since circumstances of life do not permit exact correspondence between mental capacity alone and success in occupations to occur frequently.

One lieutenant in charge of a company, after examining our score sheet of his company, stated that the 50 men he had finally picked were almost without exception at the top of our lists.

A third officer states that he was requested to select five men for especially high grade work. When he received his list of scores he found that these men were at the top of the list.

(c) The following instances show the opposite conditions:

On the recommendation of his associates and on his appearance, a man in a certain company was made a corporal. As soon as he began his work his commanding officer reports that things began to go wrong. As corporal of the guard he could not keep his men on duty and seemed unable to carry out instructions properly. When the report of scores came to this officer he found that the corporal had a low mental capacity rating. One man who showed lack of interest and decided tendency to disobey instructions in the group testing, proved on inquiry to be causing similiar trouble in his company. His score was 147—entirely too low a score in mental capacity for the rank he is holding.

Another officer reported that his corporals and sergeants were among the C men on our list. We found afterwards that the selection of these officers had been made on the basis of previous military experience.

V. COMMENTS.

7. The time when the test should be made with reference to the date of arrival of the recruit is important. In one way it would be desirable to have this examination over as soon as possible, and it might be held in connection with the physical examination immediately upon arrival. There is, however, one objection to this scheme which I believe is vital. At Camp Upton a neurologist of experience observed that nearly every recruit was suffering during his first physical examination from an anxiety neurosis; hence a psychological test at this time would be manifestly unfair. For similar reasons, it should not be made until after the effect of protective innoculations and vaccination has worn off. Another good reason for postponing it is that the specialist, before coming to a definite conclusion as to mental and nervous defects, desires a history covering the observation of company officers, and obviously the longer the period of observation, within limits, the better. In my opinion the psychological examination should not be held within three weeks of arrival at camp, and the neurological or mental examination by the medical specialist not sooner than three or four weeks thereafter.

8. An interesting and important problem arises as to what mental age should be adopted as a minimum for military service. Recruits in the E class, a majority of whom are probably mentally defective, are examined by Dr. Rudolph Pintner, who has had a very large experience in civil life in handling these cases. His belief is that any man of the mental age of 10 or over is qualified for military service; men of 8 or 9 years might be used for special service, and picked men of 7 years; these latter would, however, be a drag on other brighter men and should, if used at all, be placed in units composed of men of their own age. This is a matter which deserves further consideration and the adoption of a definite and uniform policy.

9. In view of the fact that these ratings will be used for reference in the cases of officers and men for promotion, I believe that stringent orders should be issued requiring that individual scores be considered confidential. The very fact that in some instances a consideration of the rating may turn the scale for or against a candidate, while in other instances the psychological report will be given no weight whatever—these are obvious reasons for keeping secret this important record.

VI. RÉSUMÉ.

10. Psychological tests began on October 8; up to November 10, about 90 per cent of the command, officers and men, had been examined.

11. Men are rapidly handled in company groups by four examiners, who conduct simultaneously both the intelligence and the mechanical skill tests. About half a regiment is examined each day.

12. Certain types of mental and nervous instability are identified at once and the mentally defective as soon as the scores are known.

13. There was a general concurrence of opinion among officers who had been furnished psychological ratings of men in their commands that previous estimates of mental capacity correspond in a very striking way with the scores made by these men at the examination.

14. Neurological examinations are made of all suspicious cases and of all men in the E and S classes. About half of each class are found unfit for military service.

15. The value of these psychological tests as an indication of mental capacity can not be definitely determined at present; further comparison must be made of officers' estimates and of the performance of the men with psychological scores. The general opinion at Camp Lee is distinctly favorable, and I am confident that the results obtained by Lieut. Yoakum and his co-workers amply justify the extension of the examinations to include all enlisted and drafted men and newly appointed officers.

16. There is nothing novel or experimental in the principle of applying psychological tests as a means of determining practical every-day mental capacity. It has been repeatedly made use of heretofore among big business concerns with results indicated in dollars and cents saved. The value of the work of Maj. Yerkes and his assistants consists in devising mental tests of such a nature as to serve as a practical index of the intelligence of men in the military service. If the results of the work at Camp Lee are borne out at other places, it must be admitted that Maj. Yerkes has been eminently successful.

17. The following extract from an interview with Gen. Cronkhite, published in The Bayonet of October 26, 1917, shows the opinion of the division commander in regard to value of the psychological examinations:

> It may be revolutionary, but the psychiatric board's intelligence tests will play a great part in this division. These tests are virtually conclusive; they have proved so in thousands of cases. And men who show a high intelligence rating will be watched closely; will be given every chance for advancement. Their daily work will be taken into consideration, and if they deserve promotion they'll get it. This is the program from top to bottom—officers and privates.

VII. RECOMMENDATIONS.

18. In view of the successful results of the psychological examinations at Camp Lee and of the high opinion of the value of the tests by all unprejudiced observers, including the commanding general, the chief of staff, the ranking medical officers and many company officers, I recommend that the scheme be extended to include all enlisted and drafted men and all newly appointed officers, provided competent psychologists can be found to take charge.

19. In my opinion the work should be prosecuted under the direction of the division surgeon, inasmuch as the medical department is vitally interested in the prompt identification and elimination of the mentally unfit.

HENRY A. SHAW,
Colonel, Medical Corps.

Col. Shaw prepared also the following special report on the significance of psychological ratings for the Medical Corps:

NOVEMBER 19, 1917.

From: Col. Henry A. Shaw, Medical Corps.
To: The Surgeon General of the Army.
Subject: Psychological rating of medical officers, Camp Lee, Va.

1. The psychological examinations of officers and drafted men are now nearing completion at Camp Lee, Va. Through the courtesy of First Lieut. Clarence S. Yoakum, S. C., chief psychological examiner at that camp, I am able to present certain information and data in regard to them which, in my opinion, have a very direct bearing on the present condition and future policy of the medical department.

2. The statistics which are here reported are based upon psychological tests of 1,166 officers, including—Infantry, 227; Artillery, 169; Engineers, 63; Quartermaster Corps, 72; medical officers, 236 (of whom 188 were Medical Corps, 36 Dental Corps, and 12 Veterinary Corps). The ratings of these officers as a body were as follows: In the A class (very superior; intellectually competent to command), 44 per cent; in the B class (superior; officer type), 32 per cent; in the C class (average private type), 24 per cent. Analyzing these ratings according to corps or arm of the service we find the following percentages in each grade:

TABLE 1.—*Showing by corps and arm of service percentages of officers and men in each grade.*

Range of scores	Letter grade.	Average officer group.	Medical Corps.	Engineers.	Artillery.	Infantry.	Quartermaster Corps.	Drafted men.
350–414	A	10	6	18	12	10	10	0.9
300–349	A	34	21	48	45	34	30	3.0
250–299	B	32	33	29	31	38	32	5.7
200–249	C	16	25	4	8	13	18	11.0
150–199	C	7	13	1	3	4	9	16.0
100–149	C	1	2	0	1	1	1	18.0
50–99	D	0	0	0	0	0	0	15.6
0–50	E	0	0	0	0	0	0	9.2
Illiterate and foreign								19.5

3. It will be noted that the officer group as a whole is represented by 44 per cent in the A grade; the Engineers contribute 66 per cent of their total to this grade; the Artillery, 57; Infantry, 44; Quartermaster, 30; while the Medical Corps shows only 27 per cent. In the B grade the representation of the Medical Corps is a trifle above the average, while the Engineers and Artillery are slightly below. In the C grade the average is represented by 24 per cent; the Engineers give only 5 per cent of their strength; the Artillery, 13; the Infantry, 18; the Quartermaster, 28; and the Medical Corps, 40. In other words, in the A grade, which contains 44 per cent of all officers, the Medical Corps is 17 per cent short of the average and has a smaller representation than any other group, the Engineers being two and one-half times as numerous proportionally; in the B grade, the Medical Corps is about equal to the average, while in the C grade ("average private type"), which contains only 24 per cent of the total officers, the Medical Corps is represented by 40 per cent of its strength, a far larger proportion than any other group, the Engineers showing only 5 per cent of their number; the Artillery, 12; Infantry, 18; and Quartermaster, 28. Comment on these figures is unnecessary. They speak for themselves. The only question is whether or not they represent a true state of affairs.

4. With reference to the comparative efficiency of the officers of the various arms of the service I am not in a position to judge. I am of the opinion, however, that the order of mentality as shown by the psychological scores is fairly close to the truth.

It is reasonable to believe that the Engineers have succeeded in attaching to their corps a larger number of technically trained young men than any other branch of the service. It is also probable that the officers' training camps have drawn into the commissioned grades a larger number of college-trained men than either the Quartermaster or the Medical Corps.

5. As to the question of whether these low ratings of the officers of the Medical, Dental, and Veterinary Corps are borne out by the records of the officers as a group, I should say that on the average they are, and this without the slightest disparagement to certain officers of the very best professional type whose services deserve the highest praise. I gained the impression by talking with the division surgeon and the base-hospital commander that there was a fairly large class of medical men who were so incompetent professionally that they could never become efficient medical officers; and I believe that this same state of affairs is true of most other cantonments. There is a sprinkling of medical officers of the highest character and finest professional attainments in every military camp; a fairly large group of medical men of average ability, and another group, altogether too large, of men who are lacking in early education, in medical training, and in professional skill, who were unable to earn a livelihood before the war and who welcomed the opportunity to receive the stipend of a first lieutenant. These are the men who are bringing down the ratings of the Medical Corps. If continued in the service they will cripple its efficiency and will seriously affect its prestige with the line.

6. In my opinion the medical department must immediately take steps—first, to weed out the undesirables, and, second, to prevent the entrance of such into the corps. With reference to the first consideration there are three methods by which this may be accomplished:

(*a*) Relegation to the inactive list.

(*b*) Discharge from the service on recommendation of a board of officers appointed by division commander. (Bulletin No. 32, War Dept., 1917.)

(*c*) Resignation.

The first method should not be resorted to except after the failure of the other two; but if an incompetent medical officer can not be gotten rid of by discharge, or if he can not be induced to resign, he should be put on the inactive list, even if such a procedure unduly increases the length of that list. The main object is to rid the Medical Corps of its incompetents.

7. With reference to the other two methods I recommend that the attention of division surgeons be invited to the necessity of adopting means to separate from the service all members of the Medical, Dental, and Veterinary Corps whose records indicate that they will not make efficient officers. The quickest method is resignation. Every possible means to this end should be attempted, and if all fail the officer should be brought before a board, and the division surgeon should insist on the right to name the members.

8. As to what means should be adopted to keep undesirables out of the service, I believe that the time has come when we must insist on a higher standard of professional ability and must exercise greater care in the selection of candidates. In my opinion every medical officer before being commissioned should be required to produce evidence that he has spent a year as house officer in an approved hospital, or has had equivalent practical experience. At training camps some means must be adopted to subject candidates to more rigid scrutiny as to their general intelligence and professional attainments. They should be accepted only on probation, the right being reserved by the War Department to discharge them upon the recommendation of the commandant at the expiration of the probationary period. Judging from the results of the psychological examinations at Camp Lee, the adoption of this scheme at medical officers' training camps would give the commandant a ready and reliable guide and would furnish information on which further observation could be made. I recommend that steps be taken to initiate some such scheme.

HENRY A. SHAW,
Colonel, Medical Corps.

SECTION 6.—*Recommendation for continuation and extension of psychological examining.*

Because of the importance of early decision as to the continuation of psychological service in the Army, the chief of the Section of Psychology addressed to the Surgeon General immediately after official inspection of examining in two of the four cantonments in which it had been authorized a letter requesting an early decision concerning the continuation of psychological work. It was forwarded by the Surgeon General with the following letter to The Adjutant General:

DECEMBER 7, 1917.

From: The Surgeon General U. S. Army.
To: The Adjutant General of the Army.
Subject: Continuance of psychological work.

1. Inclosed with this communication is a report from Maj. Robert M. Yerkes, S. C., chief of the Section of Psychology, Office of the Surgeon General, with reference to the psychological examinations which have been practically completed at three of the National Army cantonments; also a copy of report by Col. Henry A. Shaw, M. C., concerning the examinations of one of the cantonments—Camp Lee, Va.

2. The purpose of these tests as outlined by Maj. Yerkes is as follows:

(*a*) To aid in segregating and eliminating the mentally incompetent.

(*b*) To classify men according to their mental capacity.

(*c*) To *assist* in selecting competent men for responsible positions.

3. In the opinion of this office these reports indicate very definitely that the desired results have been achieved. Scores of drafted men, mentally incompetent, have been identified by the psychological tests much earlier in their military careers than would have otherwise occurred. The classification of men according to mental ability, as determined by these examinations, has corresponded in general, in a very striking way with the estimates previously made by officers familiar with them; and many instances could be mentioned where men selected for responsible positions, solely on their psychological records, had fully justified that selection.

4. The success of this work in a large series of observations, some 5,000 officers and 80,000 men, makes it reasonably certain that similar results may be expected if the system were extended to include the entire enlisted and drafted personnel and to all newly appointed officers.

5. There appears to be no objection on the part of commanding officers to the prosecution of this work at divisional cantonments on the ground that the time of the men is being unduly sacrificed, and I am of the opinion that these examinations can be continued without just criticism whatsoever on this score.

6. In view of these considerations I recommend that all company officers, all candidates for officers' training camps, and all drafted and enlisted men be required to take the prescribed psychological tests. I recommend also that the work be prosecuted by psychological examiners under the control of Maj. Yerkes, S. C., and at divisional camps under the general direction of the division surgeon. I recommend further that the division commanders be directed to furnish the necessary facilities for carrying out of this work.

7. The extension of the examinations will involve considerable preliminary work on the part of the Section of Psychology. I therefore request that a decision on this point be rendered as early as possible.

For the Surgeon General:

H. P. BIRMINGHAM,
Brigadier General, National Army.

The matter was referred by The Adjutant General to the Chief of Staff and by the Chief of Staff to the training committee of the War College Division of the General Staff for investigation and report. In connection with the investigation conducted by this committee, Maj. Yerkes appeared before the committee for a hearing and described at length the methods of psychological examining, the results obtained, and the plans and purposes of the Surgeon General's Office in connection with continuation and extension of the service.

At the conclusion of this hearing the training committee requested information concerning the reactions of line officers to psychological examining. It was stated by Maj. Yerkes that chief psychological examiners in the several cantonments had already been instructed to obtain statements from company commanders to whom reports had been made of the psychological ratings of their men. Maj. Yerkes further offered to request by telegram that the four chief psychological examiners forward directly to the training committee of the War College the responses of officers. The committee accepted this offer and appropriate telegrams were sent.

Pending receipt of statements from company commanders and final decision of the training committee concerning the extension of psychological work, Maj. Yerkes presented to the committee memoranda bearing on the results and success of the examinations in the camps. He

further emphasized at this time the disadvantages under which the work had progressed thus far and the opportunity for securing even greater value by the establishment of more favorable conditions.

SECTION 7.—*Reports of company commanders.*

As a result of the special request for the opinions of company commanders relative to the value of psychological ratings, 322 reports were received. They are distributed as follows: Camp Devens, 102; Camp Lee, 147; Camp Dix, 63; Camp Taylor, 10.

Analysis indicates four types of judgment concerning the value of psychological ratings: (1) Favorable; (2) favorable with qualifications; (3) unfavorable with qualification; (4) unfavorable without qualifications.

The distribution of these judgments is indicated by the accompanying table, from which have been omitted three Camp Dix reports from officers who state that they feel incompetent to judge of the results because of limited opportunity to observe, and the 10 reports received from Camp Taylor because they are not comparable with reports received from other camps.

TABLE 2.

Camp.	Favorable.				Unfavorable.			
	Without qualification.		With qualification.		With qualification.		Without qualification.	
	Number.	*Per cent.*	*Number.*	*Per cent.*	*Number.*	*Per cent.*	*Number.*	*Per cent.*
Devens	77	75	18	18	5	5	2	2
Dix	43	72	10	17	5	8	2	3
Lee	59	40	44	30	32	22	12	8
Total	179	58	72	23	42	14	16	5

In all, slightly more than 250 of the reports (82 per cent) are favorable; about 60 (18 per cent), unfavorable.

A considerable number of the reports indicated more or less serious misunderstanding of the nature and purposes of psychological examining, as well as of the significance of the results. Except for this, however, reports of commanding officers in the several cantonments would have been favorable in more than 85 per cent of the cases. This, in view of the facts that the work is entirely new, that it was done under extremely unfavorable conditions, and that the reports were made in many instances after the results had lost value for assignment, is a remarkably favorable showing.

SECTION 8.—*Decision concerning extension of examining.*

The training committee of the General Staff, on the basis of the reports of commanding officers described above, the materials supplied by the Section of Psychology, and the statements of the chief of that section, voted to concur in the recommendation of the Surgeon General that all company officers, candidates for officers' training camps, and all drafted and enlisted men be required to take psychological tests. It was further recommended by the committee that this action be taken by the War Department.

The following paragraphs from the report of the committee have peculiar significance:

Intelligence tests do not measure the educational status; they measure the intelligence status and the latter has an important bearing in estimating military service ability. It is recognized that intelligence ratings alone should not determine a man's selection for promotion, but must be supplemented by a knowledge of personality, appearance, energy, resourcefulness, military zeal, initiative, tact, and ability to command men. The record charts herewith show very clearly that the intellectual capacity as measured by the psychological examination has a large bearing on the man's position in the service.

This subject of psychology in its relation to military efficiency is an entirely new one, and the War College Division approached it with a good deal of doubt as to its value. A very thorough study of the reports submitted, however, has firmly convinced it that this examination will be of great value in assisting and determining the possibilities of newly drafted men and all candidates for officers' training camps.

The recommendations of the Surgeon General for the extension of psychological examining were approved by the War Department on December 24, 1917, and to the Surgeon General's letter of December 7, was appended the following second indorsement:

War Department, A. G. O., Dec. 24, 1917.—To the Surgeon General, U. S. Army.

With the information that the scheme of psychological examinations of company officers and all newly drafted and enlisted men is approved, and that he submit a plan to secure the services of the necessary psychologists and put this system of examination into effect.

By order of the Secretary of War:

JOHN S. JOHNSTON,
Adjutant General.

This favorable decision concerning the psychological service was peculiarly fortunate as well as gratifying to the men who were responsible for the work, because it came just before the annual meetings of the American Psychological Association. Announcement of the action was made at the meetings and the prospective need of a large increase in psychological personnel was strongly emphasized.

CHAPTER 3.

PERIOD OF EXTENSION OF EXAMINING.

SECTION 1—*Official plan and its approval.*

In compliance with the request of the Secretary of War, dated December 24, 1917, that the Surgeon General submit a plan for the extension of psychological examining, the section of psychology prepared the following as the third indorsement on the original recommendation for extension:

[Third indorsement.]

War Department, S. G. O., January 3, 1918—To The Adjutant General of the Army.

With a plan for the psychological examining of company officers and all newly drafted and enlisted men as per request of second indorsement.

PLAN FOR PSYCHOLOGICAL EXAMINING IN THE ARMY.

1. Provision of personnel.

(*a*) *Staff organization.*—The following personnel will be required for each divisional training camp or other examining station of equal size.

(1) Officers in Sanitary Corps, 4 men. Chief of psychological service, captain or major; clinical psychologist, first lieutenant, captain, or major; assistant psychologist, first lieutenant or captain; assistant psychologist, first lieutenant or captain.

(2) Noncommissioned officers, 4 men. Sergeants, 2; corporals, 2.

(3) Enlisted men (from medical or sanitary enlisted groups), 20 men.

All enlisted men will be on psychological duty only during periods of psychological group examining. At other times they will be on regular military, sanitary, or medical duty. The number of enlisted men needed will depend wholly upon the necessary speed of examining. If more than 400 soldiers are to be examined per day there will be needed four additional enlisted men for each additional hundred soldiers examined.

It is desired that commissioned and noncommissioned officers and enlisted men be specially assigned to psychological duty and be organized as a special psychological unit under the command of the chief of the psychological service.

Total estimated personnel for 31 divisional training camps and special staff, Office of the Surgeon General, and medical training camp:

Officers, Sanitary Corps, National Army.—Majors, 27; captains, 51; first lieutenants, 54.

Noncommissioned officers.—Sergeants, 62; corporals, 62; enlisted men, 620.

Officers, Sanitary Corps, 132; noncommissioned officers, 124; enlisted men, 620.

(*b*) *Sources of personnel*—

(1) Men over 31 years of age to be recommended for appointment in the Sanitary Corps as rapidly as possible, 50 (approximately).

(2) Men within draft age, qualified by professional training for psychological work and imperatively needed, 75 (approximately).

(3) Men already in the military service especially qualified for psychological examining by their professional training and transferable to the Sanitary Corps, 20 (approximately).

(4) Existing personnel for psychological service, commissioned officers, 19 (recommendations pending, 3).

Totals: Major, 1; captains, 4; first lieutenants, 14.

(*c*) *Provision for special training of men in military psychology.*—It is desired to establish a two months' training course, covering military and psychological topics of importance, under the general direction of a qualified instructor with the rank of captain or major, in connection with the training camp of the medical department at Fort Oglethorpe, Ga. The program of such a course has been prepared and submitted for necessary modification and approval to the training camp division, Office of the Surgeon General. It is provided that approximately one month be devoted to military and military medical training and an equivalent period to psychological methods as applied in the Army.

It is further provided that at least 150 officers of the Sanitary Corps shall be trained in this course for psychological service during the next six months; that at least 125 enlisted men be similarly trained during the same period. It is further desired that at least 50 commissioned officers be ordered to Fort Oglethorpe for this special course of training as soon as possible.

(*d*) In accordance with section 150 (induction into the military service out of order) of the Selective Service Regulations, it is desired to have certain qualified psychologists, not to exceed 100 in number, apply immediately, on the

approval of this plan, to their local boards for induction into the enlisted reserve corps of the medical department (either medical or sanitary service) in order that they may be ordered to Fort Oglethorpe for special training in psychological examining. A list or lists of such men will be supplied to The Adjutant General, in advance of action by the registrants, with requests that he instruct the proper local boards to have the men report direct to the commandant of the medical training department, Fort Oglethorpe, Ga., instead of to the nearest mobilization camp.

Before, during, or after the special course of training for psychologists at Fort Oglethorpe it is desired to recommend men within the draft age as well as those above that age for appropriate commissions in the Sanitary Corps. Unless it is permissible so to recommend professional psychologists between the ages of 21 and 31, the psychological service will be seriously hampered, if not rendered practically ineffective.

2. Provision of proper buildings for psychological examining:

(*a*) *General plan.*—It is deemed essential, in view of the relatively complex character of the work and the need of the rapid examining of hundreds of men per day both by groups and individually, and also because of the large quantities of apparatus, printed materials, and confidential records and report materials to be safely stored, that a special building be provided in each divisional training camp for the conduct of psychological work and for the housing of the psychological staff.

The psychology building should be located conveniently near or in connection with the proposed group of quarantine barracks or tents in which for a period of two weeks after their arrival at camp men are to be held under medical observation. So far as possible it is desired that the building be in proximity also to either the base hospital or division headquarters.

The building should provide, as per rough sketch attached[1]—(1) On the first floor, (*a*) an examining hall, approximately 30 by 60 feet, for the examining of groups of 150 to 200 men; (*b*) an examining hall, approximately 30 by 50 feet, for the examining of groups of 50 to 80 men; (*c*) a storeroom approximately 12 by 20 feet, for record materials of various sorts. (2) On the second floor, (*d*) a room approximately 30 by 40 feet, for the scoring of records; (*e*) a record room and executive office; (*f*) a storeroom for apparatus and miscellaneous supplies; (*g*) three rooms for individual examining (*h*) four rooms for officers' quarters; (*i*) wash room, toilet, and shower.

The estimated cost of the required housing facilities, including necessary furnishing of benches, tables, and chairs is $10,000 to $12,000.

(*b*) Special furniture and other equipment by rooms—Room (*a*), plain benches to seat at least 150 men; (*b*), high work benches or tables to accommodate, standing, at least 60 men; room (*c*), shelving on two sides; room (*d*), tables and chairs to accommodate 30 scoring clerks; other rooms furnished with shelving, tables, and chairs. The building will require approximately 50 chairs and 25 tables.

3. Materials for psychological work. The following are the chief materials for psychological work:

(*a*) Apparatus and materials other than printed matter: Pencils, paper, stop watches, lapboards, blackboards, charts, Stanford outfits, Point Scale outfits, performance outfits, stencils, Stenquist sets, typewriters, adding machines. Estimated cost of above equipment per camp, $500 to $750.

(*b*) Printed materials: Literacy test blanks, alpha examination blanks, beta examination blanks, individual examination blanks, individual record and report blanks, examiners' guides, and miscellaneous blanks.

Estimated cost of printed material per man examined, if the total number provided for be 1,000,000 or more, 2 to 3 cents.

4. Schedule or program of psychological work: It is provided that men shall be examined at the rate of 400 per day, but if desired that number may be increased to 800 per day without additional space or materials. From the detention quarters men would be reported in groups of 100 to 200 at examining room a, according to prearranged schedule. The following is the examining procedure:

I. Literacy test to divide the original group reported into (*a*) men who speak and write English fairly well, (*b*) those who do not; 5 to 40 per cent of the entire group. Time for this segregational test, 10 minutes.

II. The *a* group remains in examining room a for alpha examination, on the basis of which intelligence rating is given. Time for alpha examination, 40 to 50 minutes.

III. The *b* group, after literacy test of I, is transferred to examining room b, where it is immediately given the beta examination for the purpose of assignment of an intelligence rating. Time for beta examination, approximately 60 minutes.

IV. All individuals receiving intelligence ratings of E (very poor) in either alpha or beta examinations are to be given careful individual examination as promptly as is feasible.

In accordance with the results of individual examining, E men will be (*a*) recommended to medical officer for discharge, or (*b*) recommended for assignment to Service Battalion of the Depot Brigade, because of mental inferiority, or (*c*) reported as suitable for regular assignment in training organizations.

In this connection it is deemed especially desirable that a service battalion be organized for each division within the Depot Brigade to which, pending individual examination or execution of recommendation, men rated as E in mental ability may be assigned. It is further deemed desirable that service organizations be created for the effective use within the Army of men who by reason of inferior intelligence can not be satisfactorily used in regular training organizations.

So far as can be predicted at present the average time per man for psychological examination will be about 70 minutes, the average time given by psychological examiner to each man will be approximately 5 minutes. This moderate demand is conditioned chiefly by the examining of men in large groups.

[1] These sketches, as revised for constructional use, are reproduced on pp. 197f.

5. Use of results of psychological examination: The principal purposes of psychological examination will be:

(*a*) Discovery of men of inferior mentality who should either be discharged from the Army or assigned, in the light of their mental characteristics, to special organization.

(*b*) To discover men of superior or special abilities who should be assigned to regular organizations or special branches of the service in accordance with psychological findings.

(*c*) To furnish approximate measurement of mental capacity which may be used in connection with the assignment of men to organizations to the end that companies and regiments within a given arm of the service may be of approximately equal strength mentally and therefore actively.

In order that the above purposes may be achieved it is proposed that report be prepared of psychological examination of every enlisted man and every newly appointed officer and made available in connection with such other official papers concerning him as are utilized in connection with assignment. That further special report of all men of very low intelligence or of abnormal mental constitution be made to the proper medical officer.

It is clearly desirable that the results of psychological examination be properly correlated with those of other medical examinations and with the occupational and other inquiries conducted under the jurisdiction of The Adjutant General by the Committee on Classification of Personnel in the Army.

W. C. Gorgas,
Surgeon General, United States Army.

This plan was submitted to the Surgeon General for approval on January 3, 1918; was forwarded by him to the Chief of Staff, and by him to the Training Committee of the War College Division of the General Staff for consideration and report. Upon favorable report of this committee was based a fifth indorsement:

[Fifth Indorsement.]

War Department, A. G. O., January 19, 1918.—To the Surgeon General.

With the information that in accordance with directions given him under date of December 24, 1917, he is hereby authorized to establish in his office a division in psychology for the purpose of making psychological examinations of all company officers and candidate officers in officers' training camps, and also of all the newly drafted and enlisted men. The commissioned personnel for this service will be secured by recommending for commission in the Sanitary Corps selected men skilled in psychology. Where possible, men over the draft age will be recommended, but authority is hereby granted also to recommend men within the draft age, provided a sufficient number cannot be secured over the draft age.

The enlisted personnel will be secured in accordance with section 150 of the Selective Service Regulations, providing for the induction into the military service out of order of specially qualified men.

Authority is granted for the establishment of a school for special training in psychology in connection with the Medical Department Training School at Fort Oglethorpe, Ga.

The Quartermaster General will construct the necessary building at each cantonment for the examining board in psychology, and furnish the necessary plain furniture for these buildings, in accordance with plans and specifications submitted by you.

By order of the Secretary of War:

John S. Johnston,
Adjutant General.

On the basis of this approval the Division of Psychology, which had been created by the Surgeon General in accordance with authorization of the fifth indorsement, initiated on January 20, 1918, the necessary preparations for the proposed extension of psychological examining. This was done on the assumption that the War Department had unconditionally approved such necessary provisions for work as the essential personnel, suitable housing in camps and required examining materials. It was further taken for granted by the staff of the Division of Psychology that The Adjutant General would issue to commanding officers all orders necessary for their guidance and for the free and effective conduct of psychological examining. It is to be noted at this point that no general orders were issued until August, 1918, and that in consequence this new service was attempted in divisional training camps and in various other stations under decidedly disadvantageous conditions. The chief of the Division of Psychology has especially inquired of officers of the General Staff as to whether the division should have requested the issuance of orders by The Adjutant General and has been informed that it was not the duty of the Surgeon General to formulate or request the necessary orders, but that The Adjutant General of the Army should have prepared and issued them with the advice of the Surgeon General and in accordance with the expectations properly aroused by the fifth indorsement.

This is but one important instance of the difficulties in the psychological service which resulted from lack of coordination, misunderstanding, or ignorance of the nature and requirements of the work. No individual was at fault. Everyone was doing his utmost to facilitate military preparations and it is not surprising that in various directions important actions were overlooked.

Since preparations for the extension of psychological examining were varied in character and covered a period of several weeks, it is desirable that they be described under a number of categories. Of these, the most important are: Provision of personnel, provision of buildings, the revision of methods of examining and the preparation of new supplementary methods, the requisition and manufacture of necessary examining equipment, and the organization of examining in army camps.

SECTION 2.—*Provision of psychological personnel.*

STAFF OF THE DIVISION OF PSYCHOLOGY, OFFICE OF THE SURGEON GENERAL.

The principal tasks of the staff of the Division of Psychology were the organization and administration of psychological examining throughout the Army; the preparation, revision, and standardization of methods of examining; the securing of reliable standards of judgment; the formulation of suitable instructions for the guidance of examiners and of officers who desired to use psychological ratings; the accumulation of data concerning the relation of psychological ratings to military value; and the analysis of results for the preparation of official and scientific reports.

The personnel of the staff necessarily varied both in numbers and in special professional training and interest. During certain periods the staff was considerably augmented to facilitate the preparation of methods or of reports.

On March 5, 1918, the plan for the reorganization of the staff of the division to meet the requirements of the extension of work was presented to the Surgeon General. This plan provided for the following officers:

(1) Head of division: Responsible for general organization of work, direction of staff, and field activities (Rojert M. Yerkes).

(2) Assistant administrative officer and personnel officer: To be acting head of division in absence of the head (Charles S. Berry).

(3) Inspector of camp examining: To have general charge of conduct of psychological examining in stations, so far as reports to the Surgeon General's Office, Division of Psychology, are concerned (Clarence S. Yoakum and William S. Foster).

(4) Reconstructional psychological officer: To be charged with psychological aspects of reconstructional work and assigned to the Division of Special Hospitals. For purposes of organization and administration of personnel, to be considered a member also of the staff of the Division of Psychology (Melville E. Haggerty).

(5) Officer responsible for revision of methods and analysis of reports: It will be the task of this officer to conduct inquiries concerning the value of psychological examining, and to improve methods of work as well as to direct the statistical handling of results in cooperation with the statistical department of the office (Lewis M. Terman).

(6) Officer responsible for preparation of reports for the Surgeon General and other officials: This officer shall also be responsible for publicity in connection with psychological work (administrative officers and Harold C. Bingham).

(7) Statistical expert, who shall be charged with the solution of such statistical problems as arise in connection with the handling of methods and results.

(8) Trained and experienced psychological examiner who shall conduct, or supervise, such individual or group examinations as are made by the Division of Psychology on request of individuals and bureaus, within the War Department, either in or about Washington (Harold C. Bingham).

(9) A filing clerk.

(10) Statistical clerk.

(11-12) Stenographers.

The following list indicates assignments to the staff to July 1, 1919:

I. *Military appointees assigned to the staff.*—Maj. R. M. Yerkes, August, 1917, to April, 1919; Maj. K. T. Waugh, October, 1917, to March, 1918; Maj. M. E. Haggerty,[1] January, 1918, to August, 1918; Maj. C. S. Yoakum, August, 1917, to May, 1919; Maj. W. S. Foster, December, 1917, to January, 1918; August, 1918, to October, 1918; Maj. C. S. Berry, November, 1917, to November, 1918; Maj. L. M. Terman, May, 1918, to March, 1919; Maj. H. C. Bingham, December, 1917, to November, 1920; Capt. W. S. Hunter, January, 1918; Capt. E. G. Boring, November, 1918, to July, 1919; Capt. C. H. Toll, January, 1918, to February, 1918; Capt. D. G. Paterson, January, 1919; Capt. R. M. Elliott,[2] Capt. E. S. Jones, January, 1918, to February, 1918; Capt. G. C. Myers, June, 1919, to November, 1919; First Lieut. C. C. Brigham, January, 1918, to April, 1918; First Lieut. A. S. Otis, September, 1917, to March, 1918; First Lieut. L. Marcus, February, 1918, to March, 1918; First Lieut. M. A. May, November, 1918; to July, 1919, First Lieut. P. A. Mertz, April, 1919, to July, 1919; First Lieut. E. A. Lincoln, April, 1919, to March, 1920; Sergt. W. C. Trow, September, 1918, to November, 1918; Pvt. E. C. Ward, September, 1918, to December, 1918; Sergt. B. M. Oppenheim, November, 1918, to July, 1919; Pvt. R. F. Bird, March, 1918; Pvt. H. A. Hildreth, March, 1918; Pvt. J. J. Hudson, March, 1918; Pvt. H. S. Leach, April, 1918; Pvt. P. H. Russell, March, 1918, to April, 1918; Pvt. W. P. Tomlinson, December, 1917, to January, 1918.

II. *Advisory members of staff.*—T. L. Kelly, L. M. Terman (later commissioned), E. L. Thorndike, G. M. Whipple.

III. *Civil appointees, psychologists.*—J. W. Bridges, December, 1917, to December, 1918; C. R. Brown, May, 1918, to July, 1919; Margaret V. Cobb, February, 1918 to May, 1919; Alice M. Clark, June, 1918, to July, 1918; Helen Davis, July, 1918, to August, 1918; Mabel R. Fernald, May, 1918 to May, 1919; Mary H. S. Hayes, December, 1918, to January, 1919; J. J. B. Morgan (later commissioned), January, 1918; R. H. Wheeler (later commissioned), December, 1917, to January, 1918.

ORGANIZATION OF A SCHOOL FOR MILITARY PSYCHOLOGY.

The staff of the division of psychology appreciated from the first the importance of providing for the selection and training of the requisite number of officers and enlisted men for psychological examining. Immediately following approval of the plan for extension, steps were taken to organize a suitable training school for military psychology. The first move in this direction was made when Maj. Yerkes suggested to Col. P. M. Ashburn, M. C., the need of a special training school for military psychologists. Col. Ashburn expressed the opinion that a special school might be arranged for at the medical officers' training camp, Fort Oglethorpe, Ga., or Fort Riley, Kans. He referred the matter to Col. E. L. Munson, M. C., chief of the division of training camps of the Surgeon General's Office.

On learning of the nature of the need of the division of psychology for personnel, Col. Munson addressed the following memorandum to Maj. Yerkes:

DECEMBER 29, 1917.

Memorandum for Maj. Yerkes, Division of Psychology:

1. With reference to our conversation relative to the training of the officers working under your division, the training camp division is prepared to train any reasonable number of such officers at the medical officers' training camps.

2. They will be expected to conform to all the rules of discipline and administration pertaining to these camps and be given such part of the basic course of instruction as will reasonably be considered to pertain to their functions as officers under the medical department.

3. It is suggested that a course of two months would probably suffice for these purposes which would also include such amount of special training in psychology and other matters as you may think necessary.

4. Please inform this office of the number of psychologists you would desire to have trained, including the average to be so trained and the maximum number which could be expected at any one time. Please also submit a syllabus of the instruction in psychology and what other subjects you may desire to take up for consideration in getting up the general program. The latter will then be tentatively drawn and submitted to you for conference and final action.

5. Please arrange for the selection and assignment after this course is arranged of such officers as you desire to send to these training camps for duty as instructors under the commandant of the camp.

6. It is possible to establish two such schools if you so desire—one at Fort Riley, Kans., and one at Fort Oglethorpe, Ga.; but if no large number of student officers are to be instructed, it would be preferable to establish but one school, which it is considered should be established at Fort Oglethorpe rather than Fort Riley, as plans of expansion contemplate the final concentration at Fort Oglethorpe of all the training facilities of the medical department.

E. L. MUNSON,
Colonel, Medical Corps.

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[1] Assigned to duty on staff of division of physical reconstruction of Surgeon General's Office.
[2] On duty with psychology committee of National Research Council, January to April, 1919.

In response to Col. Munson's information and request Maj. Yerkes replied, suggesting a course of instruction two months long, one-half devoted to military and medical matters and the remainder to specifically psychological subjects. The letter stated that approximately 150 psychologists should be trained—50 to report in successive months.

On receipt of this information Col. Munson prepared the necessary instructions for the division of psychology and transmitted them to Maj. Yerkes in the following memorandum:

JANUARY 5, 1918.

Memorandum for Maj. Yerkes, Division of Psychology.

1. The attached letter, establishing a course for psychologists as part of the medical officers' training camp, Fort Oglethorpe, Ga., is furnished for your information.

2. You should ask for orders for the necessary officers to carry on the work in psychological training. They should be ordered to report to the commandant, medical officers' training camp, Fort Oglethorpe, Ga., for duty as instructors.

3. You should ask for orders directing the necessary officers and men to report to the medical officers' training camp, Fort Oglethorpe, for the proposed instruction. As far as possible they should report on one or two definite dates, so that companies and instruction may be organized and systematically commenced.

4. You should make request on the supply division for whatever special apparatus, equipment, and supplies will be needed in your psychological work. Effort should be made to expedite its arrival at Fort Oglethorpe. It should be addressed to the commandant, medical officers' training camp, Fort Oglethorpe, Ga.

5. You should prepare in detail a syllabus of the proposed course in psychological training, as described in paragraph 6 of the attached letter of instructions.

6. This syllabus you should send to your representative on the staff of the commandant for reference to the latter.

7. Please communicate direct with the commandant, medical officers' training camp, Fort Oglethorpe, on all matter other than those of the general policy of this course of instruction.

E. L. MUNSON,
Colonel, Medical Corps.

On the same day he prepared, by direction of the Surgeon General, a letter to the commandant of the medical officers' training camp at Fort Oglethorpe, Ga., which created and provided for the proper organization and conduct of a school in military psychology. This letter, which includes the schedule of instruction for the course, follows:

JANUARY, 5, 1918.

From: The Surgeon General, U. S. Army.
To: Commandant, Medical Officers' Training Camp, Fort Oglethorpe, Ga.
Subject: School in military psychology.

1. A school for military psychologists will be established as a special course for selected student officers, as a part of the general scheme of instruction carried out in the medical officers' training camp at Fort Oglethorpe, Ga.

2. The purpose of this school is to conduct training of psychologists along military lines, from the military viewpoint and in the military environment; and, coincidently, to develop its officers physically and train them in subjects which they should know under the conditions in which they would practice their speciality, including organization, regulations, paper work, relations with enlisted men, and their general functions as officers.

3. About 50 psychologists will be required monthly. Classes under instruction should be arranged for on the basis of a course lasting two months.

4. The senior instructor in psychology detailed by this office on the staff of instructors of the training camp will, under the supervision of the commandant thereof, be in direct charge of the course.

5. The routine work of psychologist at your camp will, as far as possible, be demonstrated and utilized as part of the subjects of instruction.

6. The general instruction to be given will relate to the principles of psychological examination.

Detailed information as to the general nature and scope of the work to be done will be furnished by the psychology section of this office.

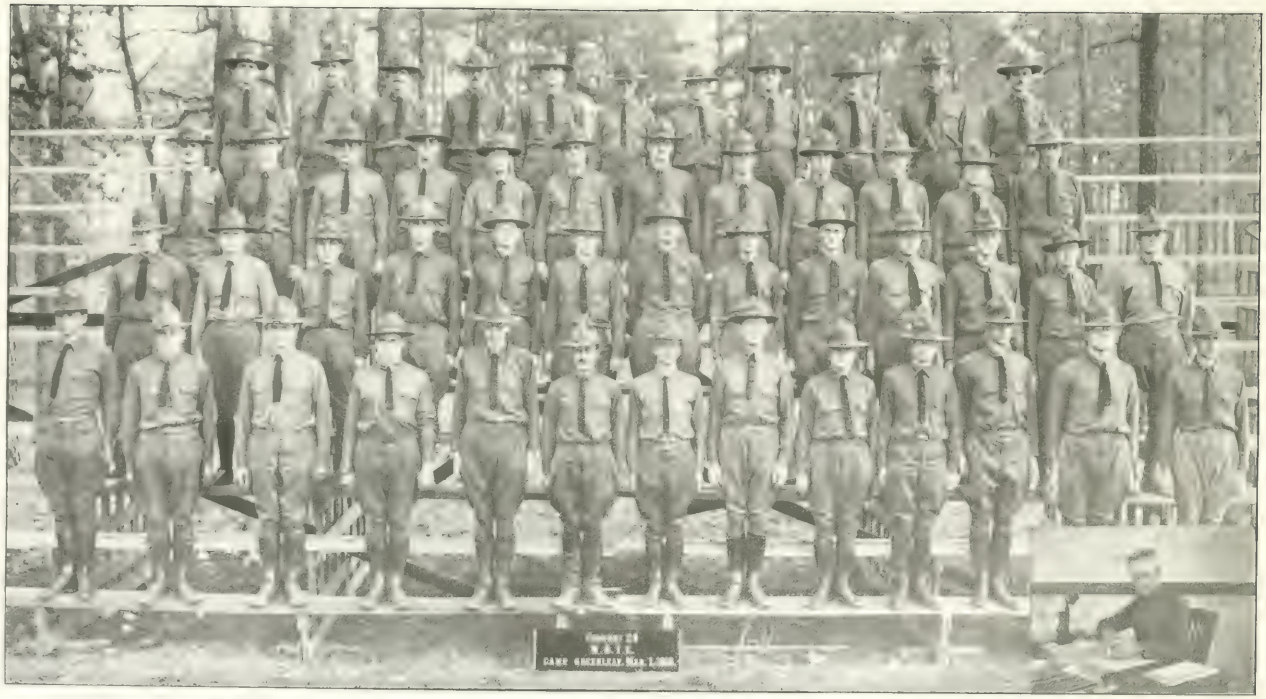
The course of instruction in psychology based thereon will be prescribed by the commandant of the training camp, after conference with the instructor in psychology.

7. The course in general training and psychology will cover a minimum of two months. In addition to instruction in other subjects, the course in psychology will comprise a total of 167 hours.

8. Officers under training as specialists in military psychology will be quartered and subsisted in the medical officers' training camp and subject to its discipline at all times.

9. They will be organized as a special company. Hours of instruction in military psychology will be arranged by the commandant of the training camp.

10. The schedule for the first month is as follows:



FIRST COMPANY OF COMMISSIONED PSYCHOLOGISTS, SCHOOL FOR MILITARY PSYCHOLOGY, CAMP GREENLEAF.

([illegible] denotes officer not a psychologist.)

[illegible] Front row: Wood, Roberts, Bruecker, Stone, Foster (instructor), Tyne (battalion major), Hunter, Hayes, [illegible], [illegible], Edwards, Steel, LaRue. [illegible] Mabe[illegible] [illegible], Norton, Sturgeon, Arr[illegible] [illegible], Jones, Pedrick, Toll. Third row: Mannel, Bates, Miller, Chamberlain, Bassett, Estabrook, Poffenberger, B[illegible], Tra[illegible], Del Rowe, [illegible] Top row: Paterson, Dallenbach, Pittenger, Bonner, Wylie, Bare, English, Sylvester, Morgan, Anderson, Houser. Maj. Yerkes is shown in the corner.

FIRST COMPANY OF ENLISTED PSYCHOLOGISTS, SCHOOL FOR MILITARY PSYCHOLOGY, CAMP GREENLEAF.

Reading along the files from front to rear— File at left: Folsom, Wilson, Cascaden, Goldberger. Second file: Zimmerly, Bruder, Neifeld, Addis, O'Brien, Wembridge, Bishop, McWharter, Holley, Rich, Paynter. Third file: Lieut. Anderson (company commander), Tomlinson, McVeigh, Dimmick, Hoffman, Muller, B. V. Moore, Brockbank, Custer, Cotter, Taub, Baird. Fourth file: Maj. Tucker (battalion commander), Williams, Coxe, Ralston, Gill, Oppenheimer, Briggs, Hitchcock, Lecky, Augenblick, Katz, White. File at right: Lieut. Toll, Wade, Humphrys, Davis, J. L. Moore, Beck, Lavelle, Hansen, Kornhauser, Sweeting, Walker, Kellogg, Cohen, Emmerich.

General Instruction.

	Hours.
Setting up (15 minutes daily for 25 days)	6.5
Drills, marches, etc	52
Inspections	4
Tent pitching, shelter tent	2
Tent pitching, pyramidal tent	2
Personal equipment of sanitary soldier	1
First aid, using soldiers' equipment only	2
Customs of the service	2
Duties of the soldier	2
Organization of military forces of the United States	2
Organization of medical department for war	2
Relation of medical department to rest of Army	1
Army Regulations	12
Manual for the medical department	12
Field Service Regulations	6
Methods of supply, at home and in the field	2
Paper work, relating to the medical department	4
Paper work, relating to the Quartermaster's Department	2
Military hygiene and camp sanatition	6

Psychological Instruction.

Organization and administration of psychological examining	6
Paper work, relating to psychological examining	6
Group examining, practice	10
Scoring, organization and methods, checking, filing, etc	12
Individual examining, practice	14
Statistical method	10
Total	180.5

11. The schedule for the second month is as follows:

General Instruction.

	Hours.
Setting up (15 minutes daily for 26 days)	6.5
Drills and marches	26
Inspections	4
The regimental detachment; its equipment, use, and internal administration	2
The ambulance company; its equipment, use, and internal administration	2
The field hospital; its equipment, use, and internal administration	2
The evacuation hospital; its equipment, use, and internal administration (including its establishment)	2
Liquid fire, poison gases, protection against, symptoms, and treatment (practical)	4
War psychoses and neuroses; shell shock	8
Trench warfare, including demonstration of trench system	2
The sanitary service, line of commmunication	2
Base hospitals, their organization and management	3
General hospitals. their organization and management	2
Organization, functions, and limitations of the American Red Cross	1
The civil sanitary function of the medical department in occupied territory	1
Manual for court-martial and military law	4
The Articles of War	1
The Geneva and Hague Conventions	1
The rules of land warfare	2

Psychological Instruction.

Examination of recruits, with papers and finger prints	3
Group examining, practice	40
Individual examining, practice	36
Statistical methods and reporting	10
Mental incompetents—Types	10
Service organizations	2
Malingering	6
Reporting results	2
Total	184.5

12. About 25 to 50 selected enlisted men, to work under the Division of Psychology, will be kept at your camp under instruction therefor. Some of them will be sent with a view to being tried out as to their fitness for appointment as officers of the Sanitary Corps under the Division of Psychology. All should be given such part of the basic course for enlisted men, including the physical, military, and professional, as might be of advantage to them in their special service with psychologists.

Their further special training under the Psychology Division will be outlined by the representative of that division on your staff of instructors subject to your approval. They should be organized as a separate company under officers of the Sanitary Corps serving under the Division of Psychology.

13. Receipt of this letter to be acknowledged.

E. L. MUNSON,
Colonel, Medical Corps.

Subsequently the Division of Psychology arranged also for a group of approximately 50 enlisted men to report at the medical officers' training camp, Fort Oglethorpe, and forwarded a syllabus of a course in military psychology and the necessary supplies. Capt. William S. Foster was appointed senior instructor in charge. In August, 1918, he was succeeded by Lieut. John E. Anderson.

The history of the School for Military Psychology is recorded in the following official reports of the senior instructors:

On January 23, 1918, Capt. William S. Foster, Sanitary Corps, National Army, was ordered to report to the commandant for duty as instructor in the school. While awaiting the arrival of student officers and men he was assigned to Company 16 of the medical officers' training group, for intensive military training. On February 4, 1918, officers and enlisted men detailed for instruction began to arrive. No barracks for the use of additional companies were at that time available, so that, until a sufficient number of officers to form a company of 25 to 30 should arrive, commissioned psychologists were assigned to companies 13, 14, 15, and 16, which were already formed from officers of the medical department. Similarly, until facilities and adequate personnel for the formation of a company of enlisted psychologists were obtained, these men were assigned to the Camp Greenleaf Infirmary Detachment. On February 8, 22 commissioned psychologists, then in camp, together with certain other officers of the sanitary and veterinary corps, were combined in company 15. Until February 16, when the psychological officers of this company became company 28, battalion VII, M. O. T. C., and moved to a section of the camp where facilities for special training were available, commissioned psychologists received the same training as that given regularly to medical officers. [The first group of commissioned psychologists, company 28, is shown in pl. 1.]

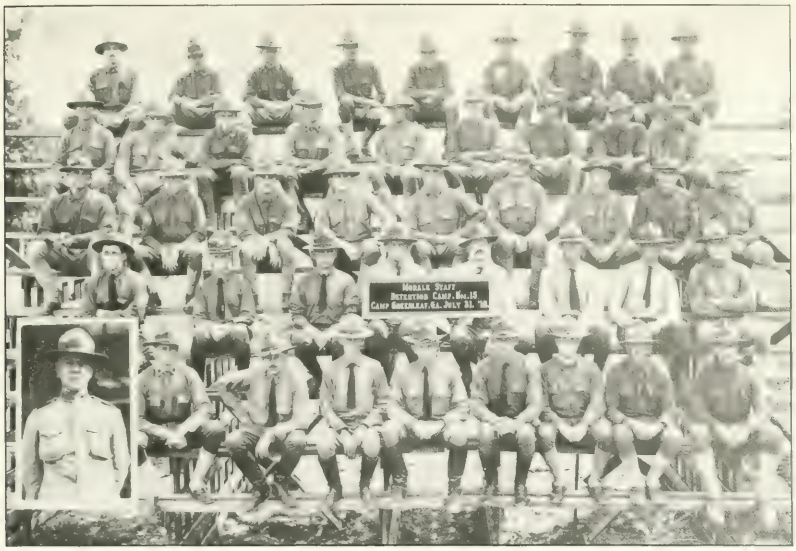
On March 7 the enlisted psychologists, then numbering 49, were moved from the infirmary to the tents of the recruit section of the division of hospitals and sanitary trains, battalion XIV, and formed company F of that battalion. In addition to their military training, special psychological training for these soldiers was begun at that time. On April 20 company F became psychological company 1, and together with the commissioned psychologists of company 28, was moved to more commodious quarters, formerly occupied by base and field hospitals. On June 20 a building, specially constructed for psychological examining, was completed and both groups of psychologists were consolidated and quartered, the officers in the psychological building itself and the enlisted men in the near-by barracks of the motor sanitary units in Camp Greenleaf annex. Formal instruction in military psychology was discontinued August 1, 1918. [The first group of enlisted men in training for psychological service, company F, is shown in pl. 2.]

* * * * * * * * * *

The content of instruction followed closely the outline given in Gen. Munson's letter to the commandant, establishing the school (see above).

The military instruction for enlisted psychologists followed as closely as possible that given to the officers, save that in certain cases, such as army regulations and manual of the medical department, abbreviations and substitutions were made, and parts of Mason's Handbook for the Sanitary Troops were used as a text. This instruction was conducted by officers of the school.

The first lectures were given in a lecture room formed by throwing together rooms in former officers' quarters. Later mess halls, and yet later a lecturer's table in the open air, before an amphitheatre under the trees, were used, until in May a special psychological building became available. This building is located centrally in Camp Greenleaf, near the headquarters of the division of hospitals and sanitary trains. It is of two stories, 120 by 30 feet. On the lower floor of the building is a large room, with benches and lap boards for the use of about 200 men in the alpha group examination. At the opposite end of the building is a similar room, fitted with benches, tables, shelves, and special lighting arrangements for the beta group examination, for about 100 illiterates and foreigners. Between these two rooms is a hallway, with a drinking fountain and supply room, which is used also as a library and is fitted with shelves and counter. Above the beta room is a well-lighted scoring room, provided with tables, chairs, and shelves and sufficiently large to accommodate 50 clerks and scorers. The remainder of the upper floor consists of five rooms for individual examining, two offices, a record room, a supply room, two lavatories, and four rooms which serve as quarters for the commissioned examining staff.



MORALE STAFF AT CAMP GREENLEAF. GEN. MUNSON IS SHOWN IN THE CORNER.

STAFF OF THE SCHOOL OF MILITARY PSYCHOLOGY, CAMP GREENLEAF, MAY, 1918.

From left to right: Capt. Foster, Lieut. Anderson, Lieut. Owen, Lieut. Murchison, Lieut. Pechstein, Lieut. May, and Lieut. Frost.

Psychological training, as outlined in Gen. Munson's letter, has been supplemented in several ways. Lieut. Mark A. May has given a course of four lectures on the political and religious creeds commonly held by conscientious objectors. Upon three occasions lectures have been given by personnel officers and supervisors, and practical experience in personnel interviewing has been secured by student officers and men at the recruit depot, Fort Oglethorpe, and at Camp Forrest. Special lectures on the psychological aspects of reconstruction have been given by Lieut. Col. Mock and Maj. Haggerty, of the Surgeon General's Office. Considerable practical experience in actual examining, both of groups and of individuals, has also been given to students. The extent of such examining at this camp will be noted in detail later in this report. The instructor in psychology has given several general lectures on the nature and purpose of psychological examining to the medical student officers, as a part of their scheduled instruction.

Psychological instruction has been conducted almost exclusively by officers of the school. The more important courses given by psychologists are as follows: Organization and administration of psychological examining (Capt. Foster, Lieut. Jones); paper work relating to psychological examining (Capt. Foster); alpha group examining (Capt. Hayes, Lieut. Murchison); beta group examining (Lieut. Wheeler, Lieut. Owen); scoring (Lieut. Wheeler, Lieut. May); individual examining (Capt. Rowe, Lieut. Anderson, Lieut. Paterson, Lieut. Pechstein, Lieut. Myers); mental incompetents (Lieut. Anderson, Capt. Rowe, Lieut. Pechstein); statistical methods and practice (Lieut. Morgan, Lieut. May); malingering (Lieut. Paterson;) conscientious objectors (Lieut. May); military topics (Lieut. Murchison Lieut. Owen, Lieut. Myers); gas instruction (Lieut. Murchison); drill (Lieut. Anderson, Lieut. Murchison, Lieut. Lane, Lieut. Owen).

* * * * * * * * *

Psychologists upon arrival in camp were given alpha examination and filled out a modified officer's qualification card. On this card were listed student's topics of specialization and publication and the amount and variety of psychological and applied psychological training as well as preference as to psychological duty. His ability in the practice courses was frequently tested and estimated by the instructors in charge. The officers' military grades were reported weekly by the company commander to the battalion commander, who revised them. In lecture courses, grades were determined by recitations and final examinations. Recommendations as to promotion and assignment of commissioned psychologists were made by a board of examiners.

In the case of enlisted men, the data on the qualification cards, the report of the company commander as to military record, and the marks obtained in the training course were similarly secured. A written examination on general psychological topics and a final oral examination furnished a further basis of recommendation by a board composed of officers of the school.

The record of the school with regard to military activities has been high. Before the system of weekly written and practical examinations to determine military grades in the officers' training camp, and of awarding a banner each week to the company showing the greatest improvement in drill and inspections, was discontinued, early in April, 22 psychological officers of the 43 who had at that time had more than a month's training had received a white hatband designating an A or highest grade, and the banner had been once awarded to company 28. In few other companies at the camp were there more than three white hatbands.

On May 31, 1918, by direction of the commandant, Camp Greenleaf, a suggested program for the organization of "psychological stimulation of troops" ("morale work") at this camp was submitted by Lieut. John E. Anderson in the absence of the senior instructor. The essential feature of this program was to begin the work in detention camp, battalion XV, with a staff consisting of one morale officer, an assistant morale officer, a chaplain, two headquarters sergeants, and one enlisted man for each company, the latter to act in the capacity of sick sergeant, to lead in informal singing on all possible occasions, and to assist in drill, games, athletics, and the giving of personal information to recruits. These psychologists cooperated with civilian agencies—Y. M. C. A., Knights of Columbus, Jewish Welfare Board, the Fosdick Commission on Training Camp Activities, and the Red Cross. A 15-day repeating program was established, including inspirational and informative talks, tagging of all recruits with a card bearing name, new address, and printed paragraph intended to promote patriotic and military ideals; the systematic direction of the writing of home letters by all recruits on their first day in camp, inclosing mimeographed letter from the section commander; the furnishing to company commanders of syllabi of inspirational talks, and the putting into effect of an evening program of two and half hours' entertainment organized as a matter of daily routine.

On June 6, 1918, the office of camp morale officer was created and Capt. William S. Foster appointed thereto. The above program was submitted for criticism to Maj. Kirk, commander of battalion XV. On the basis of his recommendations a revised program was submitted to the commandant June 12, 1918. On June 15, 1918, this revised program was ordered to be put into effect. On June 17, 1918, First Lieut. Eliott P. Frost, Sanitary Corps, National Army, was appointed assistant morale officer.

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(In pl. 3, are reproduced pictures of the staff at Camp Greenleaf in June, 1918, and of the morale sergeants.)

On January 10, 1919, Lieut. Anderson submitted a report covering the period from the relief of Capt. Foster from duty, August 7, 1918, to the abandonment of the school, January 9, 1919.

Instructional work was continued during this period on a reduced scale. Lectures and courses on psychological topics were given by Lieut. Anderson, Lieut. May, and Lieut. Owen.

An intensive three days' course on personnel work was given by Dr. E. K. Strong, of the Committee on Classification of Personnel, Adjutant General's Department. Following this work Capt. Rosenblum, of the Adjutant General's Department, conducted practice in personnel work. At another time Capt. Buehler and Mr. Evans of the Committee on Classification of Personnel gave a course in trade testing.

A greater part of the time was spent in the actual conduct of examinations. From July 27 to December 7, 1918, a total of 49,984 men was examined, including 4,474 officers.

Morale work was continued. When Capt. Foster was relieved from duty Lieut. Anderson was made camp morale officer. On August 31, 1918, Lieut. Anderson was relieved from this duty, and the assistant morale officer, Lieut. E. P. Frost, became camp morale officer. He was succeeded by Lieut. R. V. Boyce, M. C., on October 23, 1918. At this time the morale work ceased to be under the direction of a psychologist. Under Lieut. Frost and Lieut. Boyce morale work was greatly extended and the organization perfected.

The school of military psychology has undoubtedly been of extreme importance for psychological service. For however thorough the scientific training or the technical psychological training of a man, he is ill qualified for psychological work in the Army until he has had a few weeks of intensive military training, and, in addition, training in military psychology. It is believed that this school doubled the value of psychological service during the first six months of 1918.

PERSONNEL OF THE DIVISION OF PSYCHOLOGY.

Personnel lists are presented herewith. The first list shows the commissioned officers of the Sanitary Corps in psychological service, with successive commissions and dates and successive assignments to October 31, 1919. Assignment to the School of Military Psychology for purposes of instruction is indicated by the name "*Greenleaf*" printed in italics. A second list is that of the enlisted men in the medical department who were trained in the School for Military Psychology.

Adams, Edwin W	First lieutenant, March, 1918	*Greenleaf*, Upton.
Anderson, John E	First lieutenant, October, 1917	Devens, *Greenleaf*, Greenleaf.
Arps, George F	Captain, February, 1918; major, November, 1918	*Greenleaf*, Sherman, G. H. No. 36.
Ash, Isaac E	Captain, March, 1918	*Greenleaf*, Jackson.
Bailor, Edwin M	Private, March, 1918; second lieutenant, October, 1918	*Greenleaf*, Gordon, G. H. No. 17.
Baird, George M. P	Private, February, 1918; second lieutenant, October, 1918	*Greenleaf*, Grant, Logan, Travis.
Baldwin, Bird T.[1]	Major, February, 1918	S. G. O., Walter Reed Hospital.
Bare, John W	First lieutenant, February, 1918	*Greenleaf*, Taylor, *Greenleaf*, G. H. No. 6.
Bassett, Gardner C	Captain, January, 1918	*Greenleaf*, Logan.
Bates, Robert L	First lieutenant, February, 1918	*Greenleaf*, Lee.
Benson, Charles E	First lieutenant, February, 1918	*Greenleaf*, Grant.
Berry, Charles S	Captain, November, 1917; major, October, 1918	S. G. O., Dix, S. G. O., Fort Riley, G. H. No. 26.
Bingham, Harold C	Civilian, August, 1917; first lieutenant, February, 1918; captain, October, 1918; major, June, 1919.	Devens, S. G. O., MacArthur, S. G. O.
Boring, Edwin G	Captain, February 5, 1918	*Greenleaf*, Upton, S. G. O.
Boswell, Foster P	First lieutenant, March, 1918	*Greenleaf*, Wadsworth.
Breitwieser, Thos. J	First lieutenant, March, 1918	*Greenleaf*, Shelby, Pike.
Brigham, Carl C	First lieutenant, September 1917	Dix, S. G. O.
Brockbank, Thos. W	Private, February, 1918; second lieutenant, October, 1918	*Greenleaf*, Dodge, Greenleaf, G. H. No. 28.
Brown, Carl R	Civilian, August, 1917; first lieutenant, January, 1918; civilian, May, 1918.	Devens, *Greenleaf*, S. G. O.
Brueckner, Leo J	Civilian, August, 1917; first lieutenant, March, 1918; captain, November, 1918.	Lee, *Greenleaf*, Lewis, Letterman G. H.
Chamberlain, Edwin M	First lieutenant, February, 1918; captain, October, 1918	*Greenleaf*, Greene, G. H. No. 10.
Clark, Elmer B	Private, March, 1918; second lieutenant, October, 1918	*Greenleaf*, Greenleaf, Sheridan, G. H. No. 18, No. 19, and No. 3.
Coburn, Chas. A.[1]	First lieutenant, September, 1918	*Greenleaf*.
Coghill, Harvie D.[1]	First lieutenant, September, 1918	*Greenleaf*, G. H. No. 19.
Cole, Lawrence W	Captain, October, 1918	*Greenleaf*, Walter Reed.
Coxe, Warren W	Private, February, 1918; second lieutenant, October, 1918	*Greenleaf*, Bowie.
Cummings, Heber B	First lieutenant, September, 1917; captain, November, 1918	Taylor.
Dallenbach, Karl M	Captain, February, 1918	*Greenleaf*, Sheridan, G. H. No. 29.
Deerwester, David F	First lieutenant, March, 1918	*Greenleaf*, Grant, Sherman.
Denslow, Lorenzo C	Private, March, 1918; second lieutenant, October, 1918	*Greenleaf*, Taylor, *Greenleaf*, G. H. No. 3.
De Voss, James C	First lieutenant, February, 1918; captain, November, 1918	Taylor, Dix, Jackson.
Doll, Edgar A	First lieutenant, September, 1917	Taylor, *Greenleaf*, Dix.
Edwards, Austin S	Civilian, August, 1917; captain, February, 1918	Lee, *Greenleaf*, Jackson.
Elliott, Richard M	First lieutenant, February, 1918; captain, October, 1918	*Greenleaf*, Wadsworth, Sevier, Walter Reed.
English, Horace B	First lieutenant, September, 1917; captain, November, 1918	Devens, *Greenleaf*, Lewis.
Estabrook, Arthur H	First lieutenant, February, 1918; captain, August, 1919	*Greenleaf*, Gordon, G. H. No. 14, No. 3, and No. 41.
Farber, John C	Private, March, 1918; second lieutenant, November, 1918	*Greenleaf*, Humphreys, Dix, G. H. No. 11.
Ferguson, George O	First lieutenant, September, 1917	Lee.

[1] Psychological Service in Division of Physical Reconstruction.

Personnel of the Division of Psychology—Continued.

Fitch, Harry N	Private, March, 1918; second lieutenant, October, 1918	*Greenleaf*, Gordon, McClellan, Greenleaf, G. H. No. 10.
Folsom, Joseph K	Sergeant, first class, March, 1918; first lieutenant, October, 1918	*Greenleaf*, Lee, Hancock, Greenleaf, Fort Leavenworth.
Foster, Wm. S	First lieutenant, August, 1917; captain, January. 1918; major, October, 1918.	Devens, S. G. O., Greenleaf, S. G. O., Morale Branch, General Staff.
Frost, Elliott P	First lieutenant, February, 1918; captain, November, 1918	*Greenleaf*, Morale Branch, General Staff.
Fryer, Henry D	Sergeant, first class, April, 1918; second lieutenant, October, 1918	*Greenleaf*, MacArthur, Morale Branch, General Staff.
Giesel, Frederick W	Private, March, 1918; sergeant, July, 1918; second lieutenant, October, 1918.	*Greenleaf*, Humphreys, Grant, G. H. No. 28.
Goldberger, Anthony M	Sergeant, February, 1918; second lieutenant, October, 1918	*Greenleaf*, Travis, Fort Sam Houston Upton.
Haggerty, Melville E.[1]	Major, January, 1918	S. G. O.
Hansen, Clarence F	Private, February, 1918; second lieutenant, October, 1918	*Greenleaf*, Funston, G. H., Fort Bayard, N. Mex.
Harlan, Charles L	First lieutenant, March, 1918; captain, August, 1919	*Greenleaf*, Dix, S. G. O.
Hayes, Joseph W	First lieutenant, August, 1917; captain, November, 1917; major, October, 1918.	Dix, *Greenleaf*, Upton, Humphreys, C. C. P.
Hines, Harley C	Private, May, 1918; second lieutenant, November, 1918	*Greenleaf*, Humphreys, Greene, Greenleaf, G. H. No. 36.
Holley, Charles E	Private, February, 1918; second lieutenant, October, 1918	*Greenleaf*, Hancock, G. H. No. 36.
Hood, Frazer	First lieutenant, March, 1918	*Greenleaf*, Shelby, Hancock, G. H. No. 36.
Houser, John D	Civilian, August, 1917; first lieutenant, February, 1918; captain, November, 1918.	*Greenleaf*, Kearny, Letterman G. H.
Hunter, Walter S	First lieutenant, September, 1917; captain, January, 1918	Lee, *Greenleaf*, Sheridan. Devens.
Jones, Edward S	First lieutenant, September, 1917; captain, November, 1918	Lee, *Greenleaf*, Custer.
Kefauver, Harry J	First lieutenant, March, 1918	*Greenleaf*, Sevier, G. H. No. 19.
Kellogg, Chester E	Civilian, August, 1917; private, February, 1918; first lieutenant, September, 1918; captain, August, 1919.	*Greenleaf*, Custer, Dodge, Fort Sam Houston.
Lane, Lawrence W	First lieutenant, March, 1918	*Greenleaf*, Sevier, Wadsworth.
La Rue, Daniel W	Captain, January, 1918	*Greenleaf*, Meade, Walter Reed
Layton, Warren K	First lieutenant, February, 1918	*Greenleaf*, Gordon, McClellan, Greenleaf, G. H. No. 19.
Lee, Augustus S	First lieutenant, March, 1918	*Greenleaf*, Wheeler, Wadsworth, G. H. No. 3 and No. 41.
Lincoln, Edward A	Private, March, 1918; first lieutenant, October, 1918	*Greenleaf*, Lee, Funston, Fort Leavenworth, S. G. O.
Lytle, Herbert G.[2]	Private, June, 1918	*Greenleaf*.
Malmberg, Constantine F	First lieutenant, February, 1918	*Greenleaf*, Meade, G. H. No. 31.
Manuel, Herschel T	First lieutenant, September, 1917	*Greenleaf*, Pike, Beauregard, G. H. No. 1.
Marcus, Lawrence	First lieutenant, February, 1918	S. G. O., *Greenleaf*, Wheeler, Pike.
Marston, Wm. M	Second lieutenant, October, 1918	*Greenleaf*, Upton.
May, Mark A	First lieutenant, March, 1918	*Greenleaf*, Greenleaf, S. G. O.
Mearns, Wm. H.[1]	Captain, March, 1918	*Greenleaf*, G. H. No. 2, S. G. O., Walter Reed.
Mertz, Paul A	First lieutenant, April, 1918	*Greenleaf*, Greenleaf, Lee, Newport News, S. G. O.
Metcalf, John T	First lieutenant, September, 1917	Devens, Beauregard, Fort Riley, S. G. O.
Miller, Wilford S	First lieutenant, February, 1918; captain, November, 1918	*Greenleaf*, Dodge, G. H. No. 29.
Moore, Clyde B	Second lieutenant, October, 1918	*Greenleaf*, G. H. No. 28.
Moore, Henry T	First lieutenant, February, 1918	*Greenleaf*, Cody, G. H. No. 3.
Morgan, John J. B	Civilian, August, 1917; first lieutenant, February, 1918; captain, October, 1918.	Dix, *Greenleaf*, Hancock, G. H. No. 30.
Murchison, Carl A	First lieutenant, March, 1918	*Greenleaf*, Greenleaf, Sherman.
Myers, Garry C	First lieutenant, March, 1918; captain, November, 1918	*Greenleaf*, Gordon, Humphreys, G. H. No. 31, Hoboken, S. G. O.
McCrady, Roland A	Private, April, 1918; second lieutenant, October, 1918	*Greenleaf*, Sherman, Lewis, Letterman G. H.
Neifeld, Morris	Private, February, 1918; second lieutenant, November, 1918	*Greenleaf*, Wheeler, G. H. No. 17.
Norton, John K	Civilian, August, 1917; first lieutenant, February, 1918; captain, November, 1918.	Taylor, *Greenleaf*, Taylor, Fort Leavenworth.
Otis, Arthur S	First lieutenant, October, 1917	S. G. O., *Greenleaf*, Lee.
Owen, Roberts B	First lieutenant, January. 1918	*Greenleaf*, Greene, Greenleaf, G. H. No. 9.
Paterson, Donald G	Civilian, August, 1917; first lieutenant, February, 1918; captain, November, 1918.	Lee, *Greenleaf*, Wadsworth, Meade, Humphreys, Newport News, S. G. O.
Pechstein, Louis A.[1]	First lieutenant, March, 1918; captain, November, 1918	*Greenleaf*, G. H. No. 6.
Pedrick, Lawrence D	First lieutenant, February, 1918; captain, November, 1918	*Greenleaf*, Meade, Shelby, Upton.
Pittenger, Benjamin F	Civilian, August, 1917; captain, January, 1918; major, November, 1918.	Lee, *Greenleaf*, Travis, Fort Sam Houston.
Poffenberger, Albert T	Captain, February, 1918	*Greenleaf*, Wheeler, G. H. No. 19.
Ream, Merrill J	Private, April, 1918; sergeant, July, 1918; second lieutenant, November, 1918.	*Greenleaf*, Humphreys, Cody, G. H. No. 21.
Rejall, A. E.[1]	First lieutenant, September, 1918	Walter Reed, G. H. No. 16, No. 38, and No. 8.
Richmond, Harold A	First lieutenant, September, 1917; captain, October, 1918	Dix, S. G. O., Greenleaf, Humphreys, Wheeler, Walter Reed.
Roberts, Ralph S	Civilian, August, 1917; first lieutenant, March, 1918, captain, November, 1918.	Devens, *Greenleaf*, Jackson, Fremont, Kearny.
Rowe, Eugene C	Civilian, August, 1917; captain, January, 1918; major, November, 1918.	Taylor, *Greenleaf*, Greene, Shelby, Funston, G. H. No. 31.
Scott, Ira D	First lieutenant, April, 1918	*Greenleaf*, Devens.
Shumway, Howard P	Civilian, August, 1917; first lieutenant, February, 1918; captain, November, 1918.	Dix, *Greenleaf*, Funston.
Stech, Charles C	Civilian, August, 1917; first lieutenant, February, 1918	Dix, *Greenleaf*, Funston, Logan, *Greenleaf*, Letterman G. H.
Stokes, Thomas M	Civilian, August, 1917; first lieutenant, February, 1918	Dix, *Greenleaf*, Travis, Walter Reed.
Stone, Calvin P	Civilian, August, 1917; first lieutenant, February, 1918; captain, November, 1918.	Taylor, *Greenleaf*, Pike, G. H. No. 28, Custer, G. H. No. 38, S. G. O.
Sylvester, Reuel H	First lieutenant, February, 1918; captain, November, 1918	*Greenleaf*, Dodge, Grant.
Terman, Lewis M	Civilian, May, 1918; major, November, 1918	S. G. O.
Terry, Paul W	First lieutenant, March, 1918	*Greenleaf*, Grant.
Toll, Charles H	Civilian, August, 1917; first lieutenant, January, 1918; captain, November, 1918.	Dix, Devens, *Greenleaf*, Custer.
Trabue, Marion R	First lieutenant, August, 1917; captain, January, 1918	Taylor, *Greenleaf*, Grant.
Ullrich, Oscar A	Second lieutenant, October, 1918	*Greenleaf*, Fort Sam Houston, Travis.
Van Houten, Lyman H	First lieutenant, March, 1918; captain, July, 1919	*Greenleaf*, Dodge, G. H. No. 26, S. G. O.

[1] Psychological Service in Division of Physical Reconstruction.
[2] Assigned to School of Psychology for C. C. P.; commissioned in A. G. D.

Personnel of the Division of Psychology—Continued.

Wade, Francis A	Private, February, 1918; second lieutenant, November, 1918	*Greenleaf*, Pike, Greenleaf, G. H. No. 11.
Waugh, Karl T	First lieutenant, September, 1917; captain, November, 1917; major, January, 1918.	Taylor, S. G. O., Gordon, McClellan, G. H. No. 6.
Wembridge, Harry A	Private, February, 1918, second lieutenant, October, 1918	*Greenleaf*, Jackson, Meade, G. H. No. 21, Dix.
Wheeler, Raymond H	Civilian, August, 1917; first lieutenant, February, 1918; captain, November, 1918.	Devens, S. G. O., *Greenleaf*, Bowie.
White, Goodrich C	Private, February, 1918; second lieutenant, November, 1918	*Greenleaf*, Jackson, Sevier, Greenleaf, Gordon.
Wilson, William R	Sergeant, February, 1918; second lieutenant, October, 1918	*Greenleaf*, Sherman, Greenleaf, G. H. No. 29.
Wood, Benjamin D	Civilian, August, 1917; first lieutenant, February, 1918	Lee, *Greenleaf*, Cody, Kearny.
Woodruff, William H.[1]	Second lieutenant, October, 1918	*Greenleaf*, G. H. No. 16 and No. 26, S. G. O.
Wylie, Harry H	First lieutenant, February, 1918; captain, October, 1918	*Greenleaf*, Sherman, G. H. No. 8, Upton, G. H. No. 43.
Yerkes, Robert M	Major, August, 1917	S. G. O.
Yoakum, Clarence S	First lieutenant, August, 1917; captain, November, 1917; major, March, 1918.	S. G. O., Lee, Taylor, S. G. O.

Enlisted Personnel of the Section of Psychology, Medical Corps, trained in the School of Military Psychology—School for Military Psychology.

Name.	Date of arrival.	Rank on arrival.	Rank on departure from school.	Assignment to camp.
Adams, Donald W	April, 1918	Private	Sergeant	Lewis.
Addis, Walter D	February, 1918	do	do	Wadsworth.
Allenberg, Sidney	October, 1918	do	Private	Discharged.
Amdursky, Emanuel	March, 1918	do	do	Lee.
Andrews, Ralph L	October, 1918	do	do	Dodge.
Augenblick, Jack	February, 1918	do	Corporal	Funston.
Baumann, Arthur C. B	May, 1918	do	Sergeant	Devens.
Baumgartel, Walter H	October, 1918	do	Private	Dodge.
Beck, Edward J	February, 1918	do	Sergeant	Walter Reed.
Beck, Theophilis J	May, 1918	do	Corporal	Grant.
Benge, Eugene J	do	do	Sergeant	Custer.
Bernard, Henry S	do	do	do	Dix.
Beverly, Bert	April, 1918	Corporal	Corporal	Fort McHenry.
Bird, Robert F	March, 1918	Private	Sergeant	Funston.
Bishop, Homer G	February, 1918	do	do	Wheeler.
Blake, Ralph M	June, 1918	do	Corporal	Funston.
Blanchette, Joseph A	May, 1918	do	do	Hancock.
Bolwell, Robert W	do	do	Private	Walter Reed.
Bonher, Howard I	March, 1918	do	Sergeant, 1st classs	Do.
Borden, Neil H	April, 1918	do	Corporal	Hancock.
Bowie, Arthur	do	do	Sergeant	Taylor.
Bradish Norman C	May, 1918	do	do	Logan.
Bradish, Robert	do	do	Private	Discharged.
Briggs, Howard L	February, 1918	do	Sergeant	Travis.
Broehl, Leland P	October, 1918	do	Private	Grant.
Browdy, Louis	April, 1918	do	do	Upton.
Brown, Anthony J	do	do	do	Do.
Brown, Oliver W	May, 1918	do	do	Pike.
Brownlee, John W	September, 1918	do	Sergeant, 1st class	Morale Staff, Greenleaf.
Bruder, Victor X	February, 1918	do	Corporal	Funston.
Bullock, William H	April, 1918	do	Sergeant, 1st class	Walter Reed.
Bundlie, Gerhard J	October, 1918	do	Private	Dodge.
Cartland, Carl W.[1]	May, 1918	Corporal	Corporal	Walter Reed.
Cascaden, William W	February, 1918	Sergeant	Sergeant	Logan.
Cavanaugh, Paul J	May, 1918	Private	Corporal	Wadsworth.
Clark, Walter J	do	do	Private	Custer.
Clarke, Francis P	March, 1918	do	Corporal	Do.
Cohen, Joseph	February, 1918	do	Private	Upton.
Cohen William	June, 1918	do	Corporal	Do.
Coleman, Abraham E	November, 1918	do	Private	Hoboken.
Conley, Harold G	do	do	do	Upton.
Coons, Glenn C	April, 1918	do	do	Sherman.
Cornell, Arthur	September, 1918	do	Corporal	Morale Staff, Hoboken.
Corzine, Bruce H	May, 1918	do	Private	Humphreys.
Cotter, Arthur B	February, 1918	do	Sergeant	Sherman.
Cowdery, Karl M	March, 1918	do	Private	Lee.
Cox, John H	May, 1918	do	do	Fort McPherson.
Coyner, Martin B	April, 1918	do	Corporal	G. H. No. 11.
Cribbs, James E	July, 1918	do	Sergeant	Greene.
Currie, Warren G	February, 1918	do	Private	Discharged.
Custer, Everett F	do	do	do	Dix.
Davis, Greyden, R	do	do	Sergeant	Upton.
Davis, Herman B	October, 1918	Private, 1st class	Private, 1st class	Do
Dawson, John B	November, 1918	Corporal	Corporal	Sherman.
Day, Lorey C	March, 1918	Private	do	Do.
Dealey, William L	May, 1918	do	Sergeant	Meade.
Dimmick, Forrest L	February, 1918	do	do	Custer.
Doe, Westcott T	May, 1918	do	do	Kearney.
Doermann, Henry J	April, 1918	do	do	Humphreys.
Donovan, Herman L	March, 1918	do	Corporal	Taylor.
Dotzour, Grover C	May, 1918	do	Sergeant	Wadsworth.
Downing, Harold S	June, 1918	do	do	G. H. No. 16.
Edwards, Howard	May, 1918	do	Private	Dix.
Elterich, Theodore O	do	do	do	Grant.
Emmerick, Franz J	February, 1918	do	Sergeant	Sheridan.
Erickson, Carl I	May, 1918	do	do	Funston.
Evans, Walter P	April, 1918	do	Corporal	Sevier.
Feldman, Harry G	May, 1918	do	Private	Gordon.

[1] Psychological Service in Division of Physical Reconstruction.

Enlisted Personnel of the Section of Psychology, Medical Corps, trained in the School of Military Psychology—School for Military Psychology—Continued.

Name.	Date of arrival.	Rank on arrival.	Rank on departure from school.	Assignment to camp.
Fenn, Dan H.	April, 1918	Private	Corporal	Dodge.
Finkelhor, Herbert R.	May, 1918	do	Sergeant	Devens.
Fisher, Donald W.	April, 1918	do	do	Dix.
Fishkin, Joseph	October, 1918	do	Private	Upton.
Fossler, Harold R.	May, 1918	do	Sergeant	Meade.
Franklin, Henry	do	do	Corporal	Pike.
Friedman, Saul	October, 1918	do	Private	Upton.
Fromuth, Carl L.	April, 1918	do	Sergeant	Wheeler.
Garrett, John W.	May, 1918	Sergeant	do	Fort McPherson.
Gill, William	February, 1918	Private, 1st class	Corporal	Upton.
Gilliland, Adam R.[1]	April, 1918	Private	Private	Walter Reed.
Given, Philip L.	February, 1918	do	Sergeant	Pike.
Glenn, Harold H.	April, 1918	do	Private	Meade.
Goodsby, John L.	March, 1918	do	do	Upton.
Gould, Kenneth M.	do	do	Sergeant	Wadsworth.
Grasset, Oscar	May, 1918	do	Corporal	Pike.
Gray, Benjamin F.	do	do	Private	Travis.
Greenberg, Mayer	do	do	Corporal	Lee.
Greenleaf, Walter J.	do	do	Private	Walter Reed
Growdon, Clarence H.	April, 1918	do	do	Sherman.
Habberstad, Claude C.	February, 1918	do	Sergeant	Grant.
Hagner, Leonard G.	May, 1918	Private, 1st class	Private, 1st class	Gordon.
Haneman, Henry W.	October, 1918	Private	Private	Upton.
Hanmer, Harold M.	do	do	do	Sign. C., Tr. Det. Yale Univ.
Harry, Leroy	April, 1918	Sergeant	Sergeant	Funston.
Hauck, Arthur A.	do	Private	do	Kearny.
Hawes, Raymond P.	May, 1918	do	do	Sevier.
Headrick, James A.	April, 1918	do	Corporal	Gordon.
Heller, Walter S.	June, 1918	do	do	Lewis.
Hildreth, Harold A.	March, 1918	do	Sergeant, 1st class	G. H. No. 16.
Hitchcock, George K.	February, 1918	do	Sergeant	Devens.
Hoch, Alvan H.	May, 1918	do	Corporal	Custer.
Hoffer, Irwin S.	April, 1918	do	Sergeant	Wheeler.
Hoffman, Alfred M.	October, 1918	do	Private	Hoboken.
Hoffman, David M.	February, 1918	do	do	Upton.
Holmes, Chester W.	May, 1918	do	Sergeant	Sevier.
Holmes, Joseph L.	September, 1918	do	Private	G. H. No. 30.
Holzinger, Karl J.	October, 1918	do	do	Dodge.
Hoover, Walter S.	do	Sergeant	Sergeant	Hq. Mtr. Units, Greenleaf.
Hoystradt, George F.	do	Private	Private	Upton.
Hudson, James J.	March, 1918	do	Corporal	Dodge.
Humphreys, Kelso H.	February, 1918	Private, 1st class	Sergeant	Gordon.
Jackson, Lemuel T.	May, 1918	Private	Private	Taylor.
Jacobson, Reginald D.	do	do	Corporal	Custer.
Jenkins, Jack	April, 1918	do	Sergeant	Cody.
Jennings, William H.	do	do	Corporal	Bowie.
Johnson, Albert M.	do	do	do	Grant.
Johnson, Oscar J.	March, 1918	do	Private	Dodge.
Johnson, Oscar R.	do	do	Corporal	Custer.
Johnson, Martin S.	October, 1918	do	Private	Hoboken.
Jones, Charles C.	May, 1918	do	Corporal	Humphreys.
Kann, Robert U.	April, 1918	do	Private	Cody.
Katz, Samuel E.	February, 1918	do	Sergeant	Dix.
Katzenberg, David S.	October, 1918	do	Private	Upton.
Kaufmann, Herman J.	May, 1918	do	Corporal	Discharged.
Keener, Edward E.	April, 1918	do	Sergeant	Hancock.
Kemmer, Frank L.	October, 1918	do	Private	Grant.
Kennedy, Charles E.	May, 1918	do	Sergeant, 1st class	G. H. No. 10.
Kennedy, John A.	do	Sergeant	Sergeant	Walter Reed.
Kiernan, Edmund B.	October, 1918	Private	Private	Hoboken.
King, Samuel R.	May, 1918	do	Corporal	Dodge.
Kolstad, Arthur	do	do	Sergeant	Lewis.
Kornhauser, Arthur W.	February, 1918	do	Private	Dix.
Kratter, Joseph W.	March, 1918	do	Corporal	Travis.
Kuhlman, August F.	October, 1918	Corporal	Sergeant	Morale Staff, Greenleaf.
Lancaster, Elmer E.	March, 1918	Private	do	Jackson.
Landis, Estes B.	October, 1918	do	Private	Hq. Mtr. Units, Greenleaf.
Larrabee, Harold A.	May, 1918	do	Sergeant	Beauregard.
Larsen, Ulrich	October, 1918	do	Private	Dodge.
Lavelle, Michael J.	August, 1918	do	do	G. H. No. 6.
Leach, Howard S.	April, 1918	do	Corporal	Lee.
Lecky, William P.	February, 1918	do	Sergeant	Gordon.
Leibin, Abe	April, 1918	Private, 1st class	Private, 1st class	Custer.
Levy, Joseph	September, 1918	Private	Private	G. H. No. 10.
Lewis, Stuart	October, 1918	do	do	Hq. Mtr. Units, Greenleaf.
Lind, Tennie A.	March, 1918	do	Corporal	Grant.
Little, Leslie T.	November, 1918	do	Private	G. H. No. 10.
Loomis, Roger S.	May, 1918	do	Corporal	Logan.
McClain, Fred H.	July, 1918	Corporal	Sergeant	G. H. No. 10.
McElfish, Russell C.	May, 1918	Private	do	Wadsworth.
McKeon, Wallace F.	October, 1918	do	Private	Dodge.
McMahon, Thomas A.	June, 1918	do	Corporal	Logan.
McWharter, Cecil E.	March, 1918	do	Sergeant	Taylor.
Marvin, Donald M.	do	do	Private	Grant.
Massie, Welford J.	July, 1918	Private, 1st class	Sergeant	Wadsworth.
Mecke, John G.	March, 1918	Private	Sergeant, 1st class	N. C. O. School, Greenleaf.
Moore, Bruce V.	February, 1918	do	Sergeant	Walter Reed.
Moore, John L.	do	Private, 1st class	Corporal	Greene.
Morris, Frank E.	May, 1918	Private	Private	G. H. No. 30.
Morton, Richard L.	June, 1918	do	Corporal	Meade.
Muller, John J.	February, 1918	Private, 1st class	do	Upton.
Munro, Thomas	March, 1918	Private	Sergeant	Jackson.

[1] Psychological Service in Division of Physical Reconstruction.

Enlisted Personnel of the Section of Psychology, Medical Corps, trained in the School of Military Psychology—School for Military Psychology—Continued.

Name.	Date of arrival.	Rank on arrival.	Rank on departure from school.	Assignment to camp.
Murphy, Clifton	October, 1918	do	Private	Jackson.
Myhre, Olaf O	do	do	do	Dodge.
Myrick, Fred F	May, 1918	do	do	Lee.
Nau, Otto S	do	Sergeant	Sergeant	Humphreys.
Neal, Earl S	April, 1918	Private	Private	Funston.
Noble, Ellis L	May, 1918	do	Sergeant	Pike.
Oberholser, Robert M	November, 1918	do	Private	Hoboken.
Oppenheimer, Julius J	February, 1918	do	Sergeant	Dodge.
Parker, Clifford D	May, 1918	do	Corporal	Taylor.
Paynter, Richard H	February, 1918	do	Sergeant	Bowie.
Pearson, Oscar P	May, 1918	do	Corporal	Jackson.
Peiper, Frederick D	March, 1918	do	Sergeant	Grant.
Peppel, Edward L	do	do	Corporal	Wheeler.
Perla, Leo	July, 1918	do	do	Humphreys.
Perry, Stephen K	October, 1918	do	Private	G. H. No. 9.
Puhak, John I	November, 1918	do	do	Hoboken.
Rachofsky, Lester M	March, 1918	do	do	Funston.
Racioppi, Joseph	October, 1918	do	do	Upton.
Ralston, Roy R	February, 1918	do	Sergeant	Lee.
Reed, Ellery F	October, 1918	do	Private	G. H. No. 9.
Rees, Thomas L	May, 1918	do	do	Travis.
Rhawn, Hester G	November, 1918	do	do	Hoboken.
Rien, Gilbert J	February, 1918	do	Sergeant	Meade.
Rich, Harold T	March, 1918	do	Corporal	Travis.
Rickard, Garrett E	April, 1918	do	do	Sheridan.
Riggs, Cecil H	do	do	Private	Funston.
Rosenberry, Benj. F	May, 1918	do	do	Shelby.
Rosenfield, Simon D	June, 1918	Private, 1st class	Sergeant	Greene.
Rubin, Abner J	do	Private	Private	Sherman.
Rudmore, Everett	October, 1918	do	do	Upton.
Russell, Philip H	April, 1918	do	Sergeant	Bowie.
Sapiro, David	August, 1918	do	Private	Taylor.
Sarro, Altons J	April, 1918	Private, 1st class	Private, 1st class	Fort McHenry.
Schaeder, Robert C	November, 1918	Sergeant	Sergeant	Hoboken.
Schiff, Hyman	October, 1918	Private	Private	Upton.
Schmidt, Clayton	April, 1918	do	Corporal	Cody.
Schneider, Arthur M	do	do	do	Pike.
Schneider, Herbert W	do	do	Private	Humphreys.
Schoonmaker, Bernard N	May, 1918	do	Corporal	Pike.
Scriver, Harry	September, 1918	Sergeant	Sergeant	G. H. No. 14.
Shefveland, Jos. B	May, 1918	Private	Private	Jackson.
Shields, Lewis W	October, 1918	do	do	Hq. Mtr. Units, Greenleaf.
Sides, Arthur C	March, 1918	do	Sergeant	Greene.
Simon, Arthur E	May, 1918	do	do	Shelby.
Snapp, Glenn H	do	do	Corporal	G. H. No. 3.
Springside, Horace M	do	do	Sergeant	Sevier.
Springstun, Humphreys	do	do	do	Wheeler.
Stone, Charles L	do	do	Private	Devens.
Strauss, Samuel W	April, 1918	do	Sergeant	G. H. No. 3.
Sweeting, C. Lloyd	March, 1918	Corporal	Corporal	Dix.
Swirsky, Percy I	June, 1918	Private	Sergeant	Pike.
Taub, Israel Z	February, 1918	do	do	Custer.
Tea, Charles M	May, 1918	do	Private	Jackson.
Ten Hoor, Marten	April, 1918	do	Sergeant, 1st class	MacArthur.
Terrell, Marvin C	May, 1918	do	Corporal	Greene.
Thomson, Frank W	November, 1918	Corporal	do	Devens.
Thompson, Lorenzo D	October, 1918	Private, 1st class	Private, 1st cla	Pike.
Thorpe, Herbert W	May, 1918	Private	Private	Jackson.
Thompkins, Leslie J	October, 1918	Corporal	Corporal	Upton.
Tomlinson, William F	February, 1918	Private	Private	Devens.
Turck, David	April, 1918	do	Sergeant	Logan.
Tyson, George R	do	do	Corporal	Meade.
Trow, William C	June, 1918	do	Sergeant	S. G. O.
Uldendorf, [illegible]	November, 1918	do	Private	Funston.
Uhrbach, [illegible]	April, 1918	do	do	Taylor.
Veazie, Walter B	March, 1918	do	Corporal	Dix.
Waberman, Seth	May, 1918	do	do	Wadsworth.
Walker, [illegible]	February, 1918	do	Private	Upton.
Walker, [illegible]	June, 1918	do	do	Discharged.
Ward, [illegible]	April, 1918	do	do	S. G. O.
Watson, [illegible]	November, 1918	do	do	Upton.
Weber, [illegible]	April, 1918	do	Corporal	Cody.
Weeg[illegible]	April, 1918	do	do	Logan.
Weh[illegible]	November, 1918	do	Private	Hoboken.
Werner, Helmuth C. L	May, 1918	do	do	Dix.
Wes[illegible]	June, 1918	do	Corporal	Wheeler.
Wi[illegible]	May, 1918	do	Private	Upton.
Whitehead, [illegible]	April, 1918	do	Corporal	Jackson.
Whitehead, James S	March, 1918	do	Private	Upton.
Wie[illegible]	May, 1918	Corporal	Sergeant	Humphreys.
Wildman, James R	April, 1918	Private	Sergeant, 1st class	G. H. No. 10.
Wil[illegible]	May, 1918	do	Sergeant	Sheridan.
Williams, James M	do	Sergeant	do	Dodge.
Wil[illegible]	March, 1918	Private	do	Hancock.
Wills, Benjamin C	May, 1918	do	Corporal	Kearny.
Wilson, Samuel [illegible]	November, 1918	Sergeant, 1st class	Sergeant, 1st class	Hq. Mtr. Units, Greenleaf.
Wittenberg, Philip	July, 1918	Private	Corporal	Sevier.
Woellner, Robert	May, 1918	do	do	Funston.
Wolf, [illegible]	October, 1918	do	Private	Discharged.
Woo[illegible]	May, 1918	do	Sergeant	Devens.
Woodby, Carroll H	do	do	do	Lewis.
Wright, William W	do	do	Corporal	Taylor.
Young, Ralph C	November, 1918	do	Private	Hoboken.
Zimmerly, Fred W	February, 1918	do	Corporal	Jackson.
Zoellner, Herbert W	May, 1918	do	Private	Wheeler.

[1] Psychological Service in Division of Physical Reconstruction.

SECTION 3.—*Appointments and promotions in the Sanitary Corps for psychological service.*

The appointment of a number of psychologists, not to exceed 16, in the Sanitary Corps, was approved in September, 1917; these officers were to have the grade of first lieutenant. In addition, two officers were appointed for service in the Office of the Surgeon General Maj. Robert M. Yerkes to organize psychological examining, and Lieut. Arthur S. Otis to have charge of statistical work.

In the plan for extension of psychological examining to the entire Army which was approved January 19, 1918, provision was made for 132 commissioned officers, distributed as follows: 27 majors, 51 captains, 54 first lieutenants. It was assumed that the Division of Psychology would be permitted to secure this officer personnel in accordance with approval quoted on page 29 of this report.

One of the early activities of the Psychology Committee of the National Research Council and subsequently of the Section of Psychology, Surgeon General's Office, was the gathering of pertinent information concerning men who might be considered for appointment in the Sanitary Corps. Data concerning more than 600 applicants for psychological appointment were secured, properly classified, and filed. The psychological staff of the Surgeon General's Office was therefore prepared, when the need for additional officers presented itself, to recommend qualified candidates. During January and February recommendations were made in order that a group of 50 student officers might report for training at Fort Oglethorpe. Subsequently this number was increased to 79, which is 53 less than the number of commissioned officers approved by the War Department.

In accordance with the plan of the division, qualified psychologists were to be recommended for appointment as rapidly as arrangements could be made for their training at Fort Oglethorpe. This was extremely difficult because of interference of academic and other professional obligations. It would have been possible to recommend immediately on authorization the total number of 132 psychologists, but in order to secure so large a number it would have been necessary to accept many men of relatively poor equipment as contrasted with certain of the men who were willing to enter the service as soon as they could make suitable arrangements with their institutions.

Another immediate reason for delay in the commissioning of psychologists is found in the temporary postponement of recommendations. A short delay occurred in March and again early in April; a delay of several days was occasioned by the request for appointment in the Sanitary Corps of a large number of men for the gas service. About the middle of April the Division of Psychology was notified by the ranking officer of the Sanitary Corps that recommendations might be made. As it was important to secure appointments for approximately 50 additional psychologists to report in May for the training course, the necessary papers were prepared and as rapidly as possible placed in the hands of Lieut. Col. W. D. Wrightson; but before action had been taken on any of these recommendations by The Adjutant General, the Division of Psychology was requested to present an estimate of its personnel requirements during the year 1918. In response to this request a personnel table was prepared and submitted to the officer in charge of the Sanitary Corps.

Before estimate of the required personnel had been submitted, the Division of Psychology was notified that, pending careful investigation of the personnel of the Sanitary Corps, and of requirements for the various kinds of work provided for by the corps, no recommendations for appointment or promotion would be received by The Adjutant General.

Since this additional and indefinite delay threatened to interfere most seriously with the training of a sufficient number of competent psychologists, and thus to render impossible satisfactory compliance with the instructions of the War Department that all drafted men and all company officers should be given psychological examinations, the following special request for authority to recommend 50 additional psychologists for appointment in the Sanitary Corps was addressed to The Adjutant General of the Army. This letter was written by Maj. Yerkes and transmitted by Lieut. Col. W. D. Wrightson, chief officer of the Sanitary Corps.

April 18, 1918.

From: The Surgeon General, U. S. Army.
To: The Adjutant General of the Army.
Subject: Authorized personnel, Sanitary Corps, N. A., for psychological service.

1. January 19, 1918, the War Department authorized the securing of special commissioned and enlisted personnel for psychological service, in accordance with plan outlined in third indorsement, copy of which accompanies this communication.

2. This authorization provides for commissioning in Sanitary Corps of 132 officers. To date approximately 80 officers have been commissioned. It is desired to complete the number up to the original authorized quota of 132 immediately.

3. This is a professionally qualified personnel, the needs for which can not be met by officers already in the Sanitary Corps. The course in military psychology is in progress at the M.O.T.C., Fort Oglethorpe, to which it is desired to send at least 40 commissioned officers for special training on April 29.

4. The fact that the Sanitary Corps has exceeded its allowance of officers at present, renders it impossible to recommend appointment of additional psychologists. The situation is urgent. During the next few weeks the Division of Psychology will be expected to examine upwards of 200,000 men in the various recruit depots, training camps, and ports of embarkation, and unless we are able to increase our personnel immediately and rapidly, it will be utterly impossible to do the work which has been ordered.

5. In view of the above facts it is urgently requested that special authorization be immediately granted the Surgeon General to recommend appointment in the Sanitary Corps of 50 additional professionally qualified men for psychological service, the same to be ordered on appointment, to M.O.T.C., Fort Oglethorpe, Ga., for training in military psychology.

For the Surgeon General:

W. D. Wrightson,
Lieut. Col. Sanitary Corps.

On April 26 Maj. Yerkes was summoned to the War College by a member of the Committee on Organization of the War Plans Division of the General Staff. To this officer all pertinent information concerning psychological personnel and needs was presented, and at the close of the interview Maj. Yerkes was given to understand that this officer favored approval of the request for authorization to recommend the appointment of 50 additional psychologists, and that the Division of Psychology might expect final word concerning the matter the following day, Saturday, April 27. Early the following week the Division of Psychology was notified by telephone that the special request had been disapproved. Later formal notice of the disapproval was received.

The peculiarly interesting and puzzling fact about this action is that the committee on organization saw fit to disapprove an essential portion of a plan which had previously been carefully investigated and fully approved by the Surgeon General, a Committee of the War College Division of the General Staff, the Chief of Staff, and the Secretary of War. The unfavorable action of the committee was taken despite the evident fact that the training of psychologists, and thus the securing of an officer personnel adequate for immediate needs, would thereby be rendered impossible.

Having failed at various times to secure authorization by individuals or committees charged with special tasks to do precisely what the War Department had fully authorized in January, 1918, the Division of Psychology prepared in May to make the best possible use of its available personnel while awaiting final action of the Committee on Organization of the War College with reference to personnel to be allowed the psychological section of the Sanitary Corps.

On May 7 the committee recommended to the Chief of Staff that no additional ranks or personnel be allowed the psychological section of the corps pending investigation of the value of psychological examining. It also recommended that The Adjutant General address to commanding generals of National Army cantonments and National Guard camps and the commanding officers of army posts, a letter requesting report on three points—namely: (1) The value of psychological work in the military establishment; (2) the desirability of continuing the work; (3) the possibility of having medical officers make psychological examinations.

On May 16, 1918, the Division of Psychology received an informal memorandum, addressed by Lieut. Col. W. D. Wrightson, of the Sanitary Corps, to Col. C. L. Furbush, of the Medical Corps, in which it was stated that the General Staff had disapproved changes in psychological personnel pending the special inquiry described in the preceding paragraph.

By inquiry for the Surgeon General the chief of the Division of Psychology learned that, prior to July 1, reports concerning psychological work had been received by The Adjutant General, in response to special request mentioned above, from approximately 90 commanding officers. The Adjutant General had referred these reports to the Committee on Organization, which body had in turn placed responsibility for their analysis on Maj. L. P. Horsfall. Representatives of the Division of Psychology subsequently explained to this officer that the majority of the reports were unfair to the psychological service because few of the officers called upon to make report had knowledge of this new kind of work. It was indeed shown to the satisfaction of Maj. Horsfall that the reports in most instances described neuro-psychiatric work instead of psychological examining; that in other instances they confused the work of the neuro-psychiatrist with that of the psychologist; and that not more than one report in four dealt strictly with psychological examining.

As a result of this exhibition of the unreliability of the data presented in the reports, Maj. Horsfall, and subsequently Col. J. W. Craig, to whom the matter was referred on transfer of Maj. Horsfall to another division of the General Staff, concluded that the official reports supplied no basis for decision concerning the desirability of additional psychological personnel. They therefore investigated the work to their satisfaction in other ways.

To correct the serious misconceptions and prejudices concerning psychological examining which had been created by the steady influx of seemingly unfavorable official reports over a period of several weeks, the following memorandum was prepared for the Chief of Staff by the Division of Psychology.

SEPTEMBER 12, 1918.

Memorandum for the Chief of Staff.

Relative to the reports on supposedly psychological service.

1. In May, 1918, The Adjutant General directed the following letter to commanding officers of cantonments, camps, and army posts:

"From: The Adjutant General of the Army.

Subject: Additional personnel for psychological duties.

The Secretary of War directs that you submit at once to this office a report as to the benefits derived from the work of psychological officers and as to the advisability of continuing such examinations, and whether such examinations can be made by the regular medical personnel on duty under your command."

2. During May, June, and July it is understood by this office that upward of 100 replies to this request were received by the War Department. Inasmuch as these replies are supposed to be, with a few exceptions, unfavorable to psychological work, and have led to the conclusion on the part of various officers of the General Staff that this work has little, if any, value to the army and should be discontinued, it is deemed of prime importance that the following facts be considered:

3. At the time above request for report was sent to commanding officers, psychological service had been fully organized in four cantonments. Psychologists had recently been assigned to about 20 additional cantonments and camps, but they had not had opportunity completely to organize their work, much less to acquaint commanding officers with it and to demonstrate its values.

4. In this connection attention is invited to the fact that psychological service was originally introduced on a purely trial basis. As a result of extensive trial in four cantonments and careful investigation and consideration of value to the service by the War Plans Division of the General Staff, it was decided in January, 1918, to extend this service to the entire army. February, March, and April were required for preparations essential to the extension of work, such, for example, as the suitable training in military psychology of necessary officers and the manufacture and distribution of examining materials and other supplies. In May, when the request for report was made of commanding officers, the service was just about to be organized for the entire army.

5. No misleading or undesirable effects could have resulted from this premature and unfair investigation had it not been that psychiatric work had been in progress in practically all cantonments, camps, and army posts for many months. The following is what actually happened: Practically every commanding officer reported on what was supposed to be psychological service. This was done often in ignorance of the fact that no psychological work had been attempted in the station in question, and quite as frequently regardless of the fact that the work had been very recently organized and could not be fairly judged.

6. The majority of the reports received and supposed to deal with psychological work are, in fact, reports on the nature and value of neuro-psychiatric work, which is entirely independent of and different from the service for which the Division of Psychology, Surgeon General's Office, is responsible. Furthermore, in many of the camps and cantonments to which psychologists had recently been sent, the commanding officers have confused psychological and psychiatric work in such wise that grave injustice is done to both as well as to the Army itself.

7. Analysis of upward of 100 reports mentioned above indicates that the reports of line officers are at least 75 per cent favorable to psychological work in those stations where it had made sufficient progress toward complete organization to justify any report.

8. This showing is wholly in line with the result of the original trial of methods in four cantonments, for at that time the War Plans Division of the General Staff learned by direct inquiry that somewhat more than 75 per cent of the company commanders and other officers who had first-hand knowledge of psychological service and its results were favorable to the continuance and extension of the work. It would be remarkable, indeed, if the Army should have changed so radically as the large number of unfavorable reports mentioned above would seem to indicate. The case is, in fact, a perfectly clear one. The War Department has been misled by the confusion of similar terms, and the most serious of injustices to important new work in the interests of military efficiency has been done.

9. At the present time psychological work is well organized and perfectly established in all cantonments and in 10 camps. At least three out of four of these military establishments report favorably concerning the value of the work, and from the commanding officers of several of the cantonments and camps enthusiastic appreciations have been received by this office.

ROBERT M. YERKES,
Major, Sanitary Corps, U. S. A.

Although originally only the rank of first lieutenant was authorized for psychological appointees in the Sanitary Corps, in connection with the plan for the extension of psychological service, the grades of first lieutenant, captain, and major were authorized, and on the basis of this authorization the Division of Psychology proceeded to make preliminary arrangements for the appointment of psychologists of maturity, professional competence, and important position, for whom the higher grades of captain and major were essential.

The work of the school of military psychology was planned on the assumption that it would be best for the service to send officers there with relatively low grade, with the expectation of recommending them for promotion if their records justified it. In pursuance of this plan several psychologists were sent to the training camp as enlisted men who would otherwise have been commissioned as first lieutenants because of professional qualifications and obvious value to the service.

Experience during the initial stages of psychological examining in the camps indicated the serious disadvantages of having an officer with the grade of first lieutenant at the head of the work. It was therefore decided that the chief psychological examiner in the divisional training camps should in all cases be an officer with the grade of captain or major.

In order that a sufficient number of professionally qualified and experienced examiners who had been trained at Fort Oglethorpe might be rendered available as chiefs of the psychological service in various stations, the following recommendations for promotion were made to the Surgeon General in April, 1918:

For appointment as majors: Capts. G. F. Arps, W. S. Foster, J. W. Hayes, W. S. Hunter, B. F. Pittenger, E. C. Rowe, M. R. Trabue.

For appointment as captains: First Lieuts. J. E. Anderson, H. C. Bingham, L. J. Brueckner, H. B. Cummings, E. A. Doll, G. O. Ferguson, J. D. Houser, J. T. Metcalf, W. S. Miller, J. J. B. Morgan, J. K. Norton, D. G. Paterson, H. A. Richmond, C. C. Stech, C. P. Stone, T. M. Stokes, H. P. Shumway, C. H. Toll.

Because of the peculiar importance of these promotions for the psychological service, Maj. Yerkes, by permission of the ranking officer of the Sanitary Corps, presented the recommendations to the Surgeon General with full explanation concerning the professional reasons for recommending the promotion of certain men whose ages were under those usually required for promotion in the medical department. The Surgeon General referred the matter to Col. Furbush for advice. Subsequently Maj. Yerkes was twice called in conference concerning the matter, and thereupon the Surgeon General approved the promotions as listed above with three exceptions. Maj. Yerkes was notified by Col. Furbush of the Surgeon General's approval and assumed that the promotions would be made prior to the assignment of chief psychologists in the various divisional training camps. On this assumption, men who had been recommended for grades of captain or major were assigned as chiefs of the psychological service.

Late in April, and nearly a month after recommendation and approval, Maj. Yerkes learned upon inquiry concerning the reasons for delay in the promotion of certain officers, that the ranking officer of the Sanitary Corps had returned the recommendations for the promotion of psychologists to the Surgeon General, who had disapproved them. This action was taken without notification of the Division of Psychology, which proceeded with its personnel arrangements

on the assumption that the promotions would be made in accordance with the Surgeon General's officially announced approval.

The importance of this particular miscarriage of justice is greater than might at first appear, because the majority of the officers recommended for promotion had served as psychological examiners since September, 1917. Many of them are men highly trained for professional work in psychology, and qualified to hold important academic or other institutional positions. Furthermore, the failure of these promotions necessitated the organizing of psychological examining in several training camps under the direction of a first lieutenant of the Sanitary Corps. This officer, since he had to deal chiefly with officers of the line and staff of higher rank than himself, worked at a very serious disadvantage. It is scarcely possible to overemphasize the injustice to the psychological service of this particular and peculiar disapproval.

Almost simultaneously with the inquiry concerning the value of psychological examining initiated by the Committee on Organization of the General Staff, two other investigations of the work were undertaken. The one was made for and under the direction of the First Assistant Secretary of War, because of numerous criticisms which had reached the Secretary's office. This investigation was conducted by Mr. G. H. Dorr. The other investigation was conducted for the General Staff by Col. R. J. Burt.

These three inquiries into the nature and value of the psychological service were undoubtedly inspired by the same motive—namely, the desire to ascertain whether psychological examining yielded sufficiently important practical results to justify its continuation and extension. Each investigation was conducted independently.

As has already been indicated, misleading inferences and resulting unfavorable recommendations on the basis of the reports of commanding officers were avoided by action of the Division of Psychology; nevertheless further development of psychological examining awaited the reports of Col. Burt and Mr. Dorr. Both of these investigators submitted detailed statements. It is unnecessary to do more than report the nature of their conclusions and recommendations.

Formal report was made by Mr. Dorr on June 10, 1918. After describing in detail the procedures of neuro-psychiatric and psychological examining, this investigator made the following recommendations concerning psychological service:

The present force of psychologists should be transferred from the Sanitary Corps and placed under the Committee on Classification of Personnel and the psychologic work in the camps hereafter be conducted by them under the direction of the Camp and Division Personnel Officers.

The machinery now set up for the psychologic test of all men inducted into the service at the time of their arrival at camp should be given a thorough trial. To give it this trial, it is essential that the results of the psychologic tests be in the hands of the camp personnel officer prior to the time that the men are assigned out of the depot brigade. Such small increase in personnel as may be necessary to effect this should be made.

Personnel officers should be instructed to make such use of the psychologic tests in making assignments of inducted men as appears to be practicable treating the results of the tests as a rough index of mental alertness, but not of other military qualities. They should be instructed to report at the end of two months on their observations as to the value to them in their work of the information afforded by these tests. Personnel officers should be instructed to place in the hands of regimental and company commanders lists of the psychologic test rating of men assigned to the divisional organizations at the time they arrive in those organizations.

General instructions should be issued pointing out the object of the psychological tests and of the ways in which they had been found useful in certain of the camps, with instructions to company commanders to report at the end of two months their observations as to the extent of the use to which they have been able to put the tests in the selection and training of their men.

The ultimate determination of whether the group psychologic examinations are of sufficient value to warrant their continuance should await the result of the observations so obtained, for no matter what the theoretical merits or demerits of the test may be, the practical value must depend on the use to which they are put.

The existing tests should be revised, with the aid of officers accustomed to the training and handling of troops.

Psychologists attached to the camp and division personnel offices should be subject to call for aid in solving problems of discipline, training and morale. Definite steps should be taken looking to the development of this branch of the psychologic work.

The test should not be applied to officers except at the request of camp or divisional commanders and the chiefs of Staff Corps.

Officers engaged in psychologic work who fail to establish effective working relations with officers in command of troops should be promptly transferred to other lines of activity.

Col. Burt, on June 18, 1918, reported favorably, as is indicated by the following quotations:

The introduction of the Psychological Division is a distinct step forward in military progress. Its work is full of possibilities in the direction of classifying personnel, equitably distributing personnel and speeding up organization and training; however, to be productive of proper results, a firm controlling hand from the War Department must be kept upon it in order that no theorist may be permitted to ride it as a hobby for the purpose of obtaining data for research work and the future benefit of the human race, and this at the expense of present military training. Furthermore, if it is to be continued in existence, since it is of importance, it should be systematically backed up by the War Department. So far the Psychological Division has an insufficient personnel; camp commanders have not been directed to give it a place in camp organization; no building has been assigned to it; and in the overcrowded cantonments the psychologist has become a "pest," since a building was to be furnished him and none has been at hand; consequently, his examinations have been held on sufferance, here, there, and anywhere. If he had had a distinctive niche in the cantonment, where groups of men could have been sent to him systematically, little opposition to his division would have been reported by cantonment commanders. * * *

It is recommended that the Psychological Division with its examinations be continued with limitations and curtailments as follows:

Psychological examinations to be given to all candidates of officers' training schools or camps, to such other company officers only as commanding officers of stations where psychologists are on duty may designate, and to all newly drafted or enlisted men at those points where large numbers are collected for muster into the service. * * *

Rating results of psychological examinations to be presented to the division personnel officer, and by him to organizations concerned at the earliest practical moment, it being borne in mind that the greatest value of said ratings depends upon the division personnel officers being able to make use of them in the equitable distribution of men to organizations, not after distributions have been made, and by the organization commanders having ratings at hand immediately upon the entrance of men into the companies. This will speed up organization, since, within limits, it will enable commanders at once to place alert-minded men in lime for special technical instruction; among this class self-effacing nonprofessing men will gain early recognition; to at once arrange for special training for the low grades and to know immediately which are the average men for all general instruction.

That the Psychological Division be provided definitely with a building either by construction or assignment at any station where it is to work.

That the Psychological Division be given a definite personnel sufficient for its needs, and in camps or cantonments; that cantonment commanders be informed that additional permanent enlisted personnel from the depot brigade, the Medical Corps, or camp sanitary troops shall be assigned to the Psychological Division for instruction in their duties and for work in psychological examinations when needed; at other times these men to be used on other duties. So far this division has trained enlisted men in camps for use at times of incoming new drafts, and in some cases lost them by requisitioned transfer at the time the drafts appeared. Camp commanders have received no instruction to furnish any personnel for use in psychological tests. * * *

That definite orders be published covering the above, since no regulations so far have been issued through The Adjutant General of the Army to carry on the psychological examinations. The only instructions now governing at cantonments are those issued to camp surgeons from the Office of the Surgeon General. In a spirit of cooperation the camp commanders considered that this expressed a desire of the War Department to have the examinations conducted.

That a scheme be devised by which low mentality cases may be recommended for assignment to special organizations, not for service as camp police or necessarily labor organizations, but in special-training organizations under specially selected officers who will understand their particular needs for training. It is believed that the majority of such cases, although possibly requiring double time for development over that necessary for the average and superior mental grades, still can be brought forth into good average soldiers who will stand the trench strain. The undersigned is not convinced that the stupid man, with proper training and leading, is necessarily going to give way in the trenches. Through the above, the superior and average cases as determined by the psychologist to be apportioned equitably by the division or camp personnel officer to regiments and separate organizations. The average cases are included with the superior since practically the average enlisted man often becomes a better soldier than the quickly-grasping examination man, often superficial, who obtains a higher rating; particularly so, since no psychological examination can measure characteristics of leadership, loyalty, judgment, perseverance, etc., which go to make up the valuable soldier's character. It must be said, however, that, with few exceptions, the judgment displayed in picking candidates for officers (the third and fourth training camps were examined psychologically) have been confirmed by superior ratings.

The grouping of superior and average men in fighting organizations, and the below-average men to special training for replacements in fighting organizations will be a further step in advance, as the former should then complete training in much less time than they would if retarded by the slowest men. Herein lies an especial line for speeding up training. It will meet with opposition through lack of intimate contact with the psychologists, fear of the new and unknown project and the idea that the Army is to be saddled with a hobby. * * *

It is noticeable that the higher ranking officers of long military service generally condemn the psychological test as unnecessary from the standpoint of an organization commander. This is due—

(a) To the fear of having a "hobby" saddled upon the Army.

(b) To a lack of knowledge of the psychological examination and its uses.

(c) To their ability from practice to judge their own men.

(d) To the fear that examinations will encroach upon training time.

The younger officers who are now and to be company commanders are inclined to believe that the psychological ratings are of value in confirming organization commanders in their estimates of men.

So far, due to transferring personnel from and to organizations, lack of fixed personnel for the Psychological Division to enable records to be made quickly, and definite instructions to camp personnel officers, no use of value has been made of psychological ratings in organizations, except in depot brigades. Camp personnel officers have, however, used them to some extent when called upon to supply particular classes of men for special services. The application of examination results is yet in its infancy. This and continuous changing of drafted men in and from camps have prevented any systematic use of ratings by division or camp personnel officers.

The favorableness of Col. Burt's report and recommendations were both surprising and gratifying to the officers of the Division of Psychology because he had observed the psychological service only in camps in which it was either imperfectly organized or unsatisfactory because of extremely adverse conditions.

The favorable results of investigation enabled the Division of Psychology to renew its request for additional officers. This was done early in July in the following letter:

JULY 10, 1918.

From: The Surgeon General, U. S. Army.
To: The Adjutant General of the Army.
Subject: Officer personnel, Sanitary Corps, for psychological examining.

1. At present, in compliance with action taken by the War Department January 19, 1918, the Surgeon General's Office is conducting psychological examination of drafted men in 27 National Army and National Guard camps. Examinations should also be in progress in several additional camps and posts which receive or train drafted men, but the officer personnel allowed the Division of Psychology by the General Staff is inadequate to man these additional stations.

2. The following table indicates the existing distribution of officer personnel for this work and the immediate need.

(The detailed table of the needs of camps is omitted. It may be summarized as follows: Number of camps with no officers on duty, 7; with 1 officer, 6; with 2 officers, 8; with 3 officers, 10; with 4 officers, 3.

Number of camps requiring no officers or only 1, none; requiring 2 officers, 10; requiring 3 officers, 5; requiring 4 officers, 18; requiring 5 officers, 1.

Number of camps without shortage of officers, 5; with shortage of 1 officer, 13; with shortage of 2 officers, 14; with shortage of 3 officers, 1; with shortage of 4 officers, 1.

Officers on duty at camps, [illegible]; officers required at camps, 112; shortage of officers at camps, [illegible].)

3. The attached table of organization for psychological personnel, Sanitary Corps, indicates, first, the present distribution of officers now on duty in this service; second, the personnel imperatively needed to conduct psychological service effectively in accordance with the instructions of the Secretary of War.

4. The following explanatory statements supplement the data given in the proposed table of organization. At the training school in military psychology, Fort Oglethorpe, Ga., four officers are needed continuously for instructional and other camp duties.

The allowance for National Army and National Guard camps, as indicated in paragraph above, is 112 men. At present only [illegible] on duty in these stations. This number is adequate for approximately half the work which should be done. It is clear that if psychological examining is to be conducted it should be provided with an adequate personnel for complete and reasonably thorough work in every camp. The number of officers needed varies with the nature and use of the camp—from two to five.

For cooperation with psychiatric officers at recruit depots and certain other stations, such, for example, as disciplinary barracks, Fort Leavenworth, either one or two psychologists are needed. The allowance made in the table for these stations is 16. At least this number is required for immediate assignment in compliance with urgent and repeated requests from Col. Bailey, Chief of the Division of Neurology and Psychiatry, Surgeon General's Office.

[illegible]

	[illegible]							[illegible]						
	Colo-	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]			[illegible]	[illegible]	[illegible]		[illegible]							
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[illegible]			[illegible]				[illegible]			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

In the Surgeon General's Office for administration of psychological examining, development, revision, and improvement of methods, and the analysis and reporting of results, and for the conduct of such examining as is requested in and about Washington, five officers are required.

The total of the above items is 137 officers.

5. It is desired that this table of organization be approved in order that approximately 30 enlisted men in the Medical Corps who have had two months' training in military psychology at Fort Oglethorpe may be appointed either as second lieutenants or as first lieutenants for psychological service, and that approximately 30 psychologists not at present in the service may be recommended immediately for appointment in the Sanitary Corps and ordered to Fort Oglethorpe for necessary military and psychological training in preparation for assignment.

In this connection it must not be overlooked that training in military psychology is absolutely essential for effective work in examining stations. This office is not willing to commission men and assign them to duty as examiners without the special training given at Fort Oglethorpe. Since the school of military psychology at Fort Oglethorpe is the only source of officer supply, it is clearly important that this office be authorized to send additional psychologists to that station at the earliest possible moment for training in preparation for assignment to various camps and posts.

For the Surgeon General:

R. B. MILLER,
Colonel, Medical Corps, N. A.

The above request for permission to increase the officer personnel of the Division of Psychology to a total of 137, which was only five more than the number authorized in January, 1918, by the War Department, was disapproved early in August, in accordance with the following indorsement, on recommendation of the Division of Operations of the General Staff and, as later appeared, as a result of complete misunderstanding of the nature and purpose of army psychological examining.

War Department, A. G. O., August 13, 1918—To the Surgeon General of the Army.

1. The request of the Surgeon General for additional Sanitary Corps officers for psychological examining duties is not favorably considered.

2. It is not considered necessary that every soldier passing through divisions, depot brigades, replacement training centers, or recruit depots be given a minute psychological examination. Suspected or doubtful cases should be set aside for special examination and study.

3. A great part of the work connected with psychological examinations should be performed by medical officers on duty at depot brigades, recruit depots, base hospitals, etc., the expert psychologists being called upon for advice whenever necessary.

By order of the Secretary of War:

C. S. MCNEILL.

It is perfectly clear from this indorsement that the misleading reports of commanding officers referred to above determined the decision and the specific recommendations.

Since the disapproval rendered it practically impossible to continue the service satisfactorily, and since it also did grave injustice to the personnel by rendering promotion impossible, a request for reconsideration, accompanied by detailed statement of the principal facts concerning the service, was prepared for the Surgeon General by the Chief of the Division of Psychology and forwarded to the Chief of Staff early in September. This lengthy communication is reproduced here in full because it gives a connected account of the chiefly significant incidents in the provision of the commissioned personnel for psychological examining from the beginning of this work to September, 1918.

Preparatory to the formulation of this request for reconsideration, the Chief of the Division of Psychology conferred with various members of the General Staff, and thus learned of the surprising misunderstandings and prejudices which had developed as a result of the misleading reports from commanding officers.

AUGUST 31, 1918.

From: The Surgeon General, U. S. Army.
To: The Chief of Staff.
Subject: Commissioned personnel for Psychological Section, Sanitary Corps.

1. On July 10, 1918, the Surgeon General's Office made request through the Adjutant General for additional appointments and grades in the Sanitary Corps, Psychological Section. This request was disapproved by second indorsement, dated August 13, 1918.

2. Almost simultaneously with disapproval of request for psychological personnel, General Orders, No. 74, establishing psychological work and definitely providing for its conduct, was approved. These two important actions are so related to one another that it is obviously impossible for the medical department to comply with the spirit of the general order. It is therefore necessary to renew immediately request for additional psychological personnel and grades, basing estimate

of need upon General Orders, No. 74, and such existing special requests or established relations of psychological work as are deemed of primary importance.

3. The attention of the staff is respectfully called to the fact that by order of the Chief of Staff psychological service has been thoroughly investigated during the past three months and fully reported on; that as a result of this investigation and report Col. R. J. Burt, of the War Plans Division of the General Staff, prepared, by direction of the Chief of Staff, general order referred to above.

Thus far, in connection with provision of personnel for psychological work, the investigation, report and recommendations of Col. Burt have been ignored.

Simultaneously with investigation by the General Staff, the Assistant Secretary of War ordered thorough inquiry concerning psychological service. Such inquiry was made with extreme care by Mr. G. H. Dorr, of the Secretary's office. Mr. Dorr's report was favorable to the continuance of psychological work, and especially called attention to its importance as supplementing the personnel work of the Army.

On recommendation of the War Plans Division a letter of inquiry concerning the value of psychological work, its continuance, and the possibility of having medical officers take charge of it was sent to the commanding officer of cantonments, camps, and posts. This letter elicited upward of 90 replies, most of which had nothing to do with psychological service, since psychological examiners had at the time of the inquiry been assigned to relatively few stations. Almost all of the reports confused psychological service with neuro-psychiatric work. Several of the remainder, ostensibly reporting on psychological service, were from stations in which the work had been but recently established and was incompletely organized. The conclusion of all officers of the staff who considered these reports on their merits is that they are entirely irrelevant to the psychological service, grossly misleading, and therefore valueless as a basis for decision concerning the continuation, conduct, or relations of psychological work.

The attention of the staff is invited to the fact that psychological service is entirely distinct and different from neuro-psychiatric service. The psychological work has reference primarily to classification according to intelligence and effective assignment, whereas the neuro-psychiatric examining has to do with mental diseases or pathological conditions.

4. The numerous reports, memoranda, and official actions concerning psychological service which have accumulated during the past year make it wholly clear (1) that there has been much confusion, misunderstanding and uncertainty concerning this new work; (2) that whenever the staff has secured reliable information from the department and officers who are responsible for the psychological service or from line officers who have had opportunity to judge of its value, the resulting action has been favorable; (3) that all unfavorable decisions have been based upon the mistaken idea that psychologists are attempting to do a portion of the work of the medical department or that the examination of every individual is unnecessary because most men are mentally normal; (4) that although the War Department has ordered competent investigators to make exhaustive inquiry concerning the value of psychological work to the service, action has sometimes been based upon fragmentary or incorrect information instead of upon reliable and unprejudiced official reports of investigators and of the Surgeon General.

5. Conferences with General Staff members have indicated the extreme desirability of presenting in connection with this request statements concerning the present status of psychological service, its varieties, ways in which its results are being used, and the judgment of various line and medical officers on its values.

6. In order that the specific requirements of general orders No. 74 may be complied with, it is requested that increase in personnel as indicated below be authorized.

(*a*) It is ordered that the Psychological Division be established at those points where depot brigades are or will be established. The experience of the division has proved that four commissioned officers are required for the satisfactory organization and conduct of the various kinds of psychological service demanded by depot brigades and desired by personnel adjutants, commanding officers, and medical officers. Every cantonment will have a depot brigade. It is estimated that during the next few months there will be at least an average of four additional depot brigades. This statement is based upon the best information that the Division of Psychology has been able to secure from the Operations Division of the General Staff. It is therefore indicated that for psychological staffs in 20 Depot Brigade camps 80 commissioned officers will be needed.

These officers will see (1) that an intelligence grade is secured for every man reporting in depot brigade; (2) that this grade is promptly entered by personnel adjutant on the qualification card and used as relevant information in connection with assignment of men to duty; (3) that the mental grade, along with other important personal data, is promptly reported to the commanding officer to whom soldier is assigned; (4) that profitable ways of using information concerning soldier's mental rating shall be explained to and discussed with commanding officers; (5) that medical officers shall be assisted as seems necessary or desirable in the examining of men of low grade mentality or those who are difficult to train or to control.

Psychological service in the depot brigade will be primarily personnel work, despite the fact that it is conducted under the supervision of the Surgeon General. Its only medical aspect and reference will be cooperation of psychologists with medical officers and assistance of the latter in securing mental grades for men who are either feeble-minded or so nearly so that they can not be assigned to regular military organizations.

It is regarded as important by the Committee on Classification of Personnel in the Army that intelligence grade be furnished by the psychological staff to the personnel adjutant for every soldier within a few hours after he reaches camp. Dr. Walter D. Scott, director of the personnel committee, has prepared a statement of opinion which is appended to this letter.

This task necessitates the group examining of draftees in depot brigade camps. All available evidence indicates that intelligence grade or rating is of great practical importance.

The Division of Psychology urgently requests that in connection with action on personnel for psychological work, the personnel committee of the War Department and the following officers, who have made special study of psychological work, be consulted: Col. R. J. Burt, Lieut. Col. L. P. Horsfall, Lieut. Col. Edgar King, Dr. W. D. Scott, and Mr. G. H. Dorr.

Far more pertinent than would at first seem is the following paragraph from cablegram received by the War Department from Gen. Pershing, July 17, 1918:

Prevalence of mental disorders in replacement troops recently received suggests urgent importance of intensive efforts in eliminating mentally unfit from organizations new draft prior to departure from United States.

It is doubtful whether the War Department can in any other way more importantly assist to lessen the difficulty felt by Gen. Pershing than by properly providing for initial psychological examination of every drafted man as soon as he enters camp. The examination is made on men in large groups and requires very little time. It enables the examiners to single out for special study and report those cases which are of doubtful value to the service and which perhaps should be used in this country rather than overseas. In the opinion of line officers, medical officers and psychologists as well as of the civilian experts who have inquired into this matter for the Secretary of War, it is of prime importance to use the simple methods of mental rating which have been devised to assist in classifying and properly placing soldiers of the United States Army.

The following description of conduct of group psychological examination of drafted men as they report in camp is taken from the report of the chief psychological examiner at Camp Dix. It at once indicates the simplicity and expeditiousness of the procedure. It is literally true that no officer, so far as this division has been able to learn, who has observed this method of making a mental survey of our drafted men and of thus securing results which are immediately useful to personnel adjutants, to company commanders and to medical officers, has remained unconvinced of the practical importance of this work for the army.

[A verbatim account of procedure in examining at Camp Dix is omitted here. The account shows the dispatch with which examination is conducted and its coordination with the other procedures through which the recruit must pass.]

(*b*) "The psychological division shall be established at Camp Humphreys, Virginia." To comply with this specific order it is necessary to send a staff of four officers to this engineer's camp. The organization will be in no wise different, so far as can be foreseen, in Camp Humphreys than in any other divisional training camp.

The engineers of the Army have been keenly and intelligently interested in psychological service and have sufficiently appreciated its possibilities especially to request that the work be adequately provided for in their large camp. In this connection attention is directed to letter, which is appended, concerning psychological service, written November 22, 1917, by Col. E. W. Markham of the 303d Engineers. This letter was written very early in the history of psychological service in the United States Army and when methods were relatively crude and results certainly much less valuable than to-day.

(*c*) A staff of five commissioned officers is required for the proper conduct of service in the Office of the Surgeon General. This includes, in addition to an administrative officer, an assistant administrative officer who is also responsible for personnel; two officers charged with the analysis of reports, revision of methods, and preparation of new methods; and an officer in charge of materials, who serves in addition as an examiner, responding to requests for psychological examinations in and about Washington.

During the past year more than 5,000 examinations of commissioned officers, enlisted men, and civilian personnel of various corps of War Departments have been made in and about Washington by special requests of commanding officers or heads of departments.

It is further necessary to provide two inspectors who shall from time to time thoroughly investigate the organization and conduct of psychological service in camps and other stations and fully report thereon to the Division of Psychology, Surgeon General's Office. At present two inspectors are on duty.

(*d*) "A school for military psychology shall be established at Fort Oglethorpe, Georgia." This portion of the general order has already been complied with, since a school was organized at Fort Oglethorpe in February, 1918. Since that time more than 70 officers of the Sanitary Corps, psychological service, have been given at least two months' intensive training in the school. There have also been trained during the same period approximately 260 enlisted men, most of whom accepted voluntary induction into the army at request of the Division of Psychology on account of their special professional qualifications and intellectual fitness for psychological service. This is probably by far the strongest group of enlisted men in the United States Army. Approximately 25 per cent of the enlisted men, in the judgment of the instructional staff and of the commanding officer at Fort Oglethorpe, earned promotion to commissioned appointments in the Sanitary Corps during their service as students in the School of Military Psychology.

The attention of the staff is especially invited to the following fact: Practically all of the enlisted men in the psychological service are college graduates who have had in addition professional post-graduate work in psychology and allied topics. Is is safe to say that practically every one of the nearly 25 per cent of this personnel recommended for commission by the authorities in Fort Oglethorpe would have won commissions in an officers' training camp. Nevertheless, the action of the War Department in disapproving provision of adequate personnel for psychological service has rendered it impossible for the medical department to promote these men from the enlisted group. They are to-day, as they have been for months, doing officers' work although they are still enlisted men. The seriousness of this injus-

tice can not easily be overemphasized. The Division of Psychology has done everything in its power in the first place to avoid injustice, in the second place to remedy it by securing approval of additional appointments.

For the instructional staff of the School of Military Psychology at Fort Oglethorpe and for the conduct of psychological service in Camp Greenleaf a staff of five commissioned psychologists is required.

(*e*) The Psychological Division is required by general order to maintain at the school for psychological personnel, Fort Oglethorpe, Ga., a trained reserve and a reserve in training, composed of officers and enlisted men. In view of the varieties of psychological service now in progress, it is believed that the trained reserve of commissioned officers should number 15 men. Since more than 260 enlisted men have already been trained and are available for duty in the camps, it will be unnecessary to train any considerable number of psychologists in the enlisted group. It is believed to be desirable to select so far as possible for this service limited service men with proper educational and professional qualifications. This has been done in the past so far as has seemed feasible and will be continued in the future.

The reserve of commissioned officers in training will, it is believed, be adequately provided for by the regular 10 per cent allowance granted in connection with officer personnel.

The above items under letters (*a*), (*b*), (*c*), (*d*), and (*e*) meet the specific personnel requirements of general order No. 74; but in addition it is to be noted that the orders provide that commanding officers shall requisition psychologists for various kinds of work in accordance with need. It is therefore necessary to enumerate, as in the following paragraph, needs which are existent and demands which, aside from those listed in this paragraph, are urgent.

7. It is deemed essential by the Division of Psychology, Office of the Surgeon General, that psychological personnel be provided as follows:

(*a*) The War Department committee responsible for the organization and conduct of development battalions desires that a well trained and otherwise competent psychologist be assigned in each camp for service on staff of development battalion. It is understood that he should be responsible for morale work in the battalion as well as for specifically psychological work and certain educational measurements, and that he should assist not only with the classification and rating of men, but also with their training. Since every camp will have its development battalion, 32 commissioned officers will be needed.

On August 31 a letter was addressed to the Chief of Staff by the Surgeon General requesting authorization for appointment in the Sanitary Corps of 32 officers to be assigned to duty in development battalions as officers responsible for morale, mental examining (aside from neuro-psychiatric), and measurements of soldiers' response to training.

Evidence already accumulated in the form of reports received by the Surgeon General's Office, statements by line officers and officers of the General Staff, indicates convincingly that the assistance of psychologists in development battalions is likely to prove of great and increasing importance and to be urgently desired, requested, and, unless otherwise provided for, requisitioned in accordance with General Orders, No. 74, by commanding officers of these organizations.

It is believed that the psychological officer assigned to development battalion service can be adequately supported by privates or noncommissioned officers trained in military psychology and that on the whole it is likely to prove desirable to use competent enlisted men for much of this work rather than commissioned psychologists. One commissioned officer for development work in each camp will be absolutely essential, however.

(*b*) At present psychological work is organized and in progress in 27 camps. It is being organized in one additional camp, and has been requested by commanding officers in yet another camp. Several of these camps will not have depot brigades, and therefore would not by order be supplied with psychologists. In view of this situation the Division of Psychology recently telegraphed several camps which lack depot brigades, but in which psychological work has been organized, requesting that permission be granted to remove psychological officers. In every instance this permission was refused on the ground that the psychological work was needed in the camp. The indications that this action is based upon substantial evidence of the practical value of psychological work are such that the Surgeon General's Office does not deem it either wise or expedient to entirely abandon psychological service in camps which lack depot brigades. Since, however, there would be relatively little group examining to be done in these canps and the work would consist chiefly of the study of individuals who proved inapt, unruly, or otherwise difficult to use in the regular organizations, it would be necessary to assign only one psychologist to each of these camps in addition to the psychologist assigned to the staff of the development battalion.

It is estimated that there will be at least 12 camps lacking depot brigades, but in every sense entitled to and almost without exception desiring psychological service. An allowance of 12 commissioned officers is therefore requested for such assignment.

Psychological service has not been organized in Camps Beauregard, MacArthur, McClellan, Fremont, or in the camp of limited service men at Syracuse. MacArthur has especially requested the assignment of a psychologist, but lack of officer personnel has rendered it impracticable to attempt to comply with this request.

(*c*) The Division of Military Aeronautics has recently requested the General Staff to authorize the application of psychological methods to its enlisted personnel. This request was indorsed by the Surgeon General with the recommendation that the existing organization and personnel for psychological service, medical department, should so far as possible be used for conduct of work in the Division of Military Aeronautics.

The Division of Neurology and Psychiatry of the Surgeon General's Office has repeatedly and insistently requested assignment of a psychological examiner to each neuro-psychiatric board. It is estimated by the chief of this division of the Surgeon General's Office that at least 20 psychologists should be available for such service. The Division of Psychology has never been able to assign men in compliance with these requests because of the shortage of

officer personnel. This estimated need is not included in the following tables, because it is deemed desirable that the Division of Neuropsychiatry should make special request direct to the Surgeon General and that if the Surgeon General approve the assignment of psychologists to assist neuro-psychiatric boards the General Staff should be asked to authorize the necessary increase in psychological personnel.

Further, the Division of Physical Reconstruction has requested the assignment of psychological officers, one to be stationed in each special reconstructional hospital.

8. The following table indicates the distribution with respect to assignments and grades of the 77 officers of the Sanitary Corps authorized by the General Staff for psychological service.

[Two tables, which were included in the memorandum, are omitted here. They were similar to the table furnished The Adjutant General—see p. 47, but were more detailed. They showed the number of officers on duty—majors, 3; captains, 16; first lieutenants, 56; total, 75; and the number of officers required—lieutenant colonel, 1; majors, 25; captains, 46; first lieutenants, 43; second lieutenants, 40; total, 155.]

9. The following information concerning the history and status of personnel in the psychological service is extremely important in connection with general staff action on present request:

When the medical department originally, in September, 1917, undertook to make a thorough trial of proposed methods of mental examining in order to determine their value to the military service, 16 competent psychologists were commissioned as first lieutenants in the Sanitary Corps. This grade was given irrespective of age, professional status, previous military experience or prospective value to the service. Some of the men should have been majors, others captains and a few second lieutenants, but the grade of first lieutenant was the only one made available.

At the same time, by authorization of the Secretary of War, 24 men were given civil appointment as psychological examiners. This was done because the Surgeon General deemed it undesirable to commission many psychologists prior to demonstration of the military value of proposed methods. Most of these civil appointees were men of professional qualifications similar to the commissioned officers, and if appointed in the Sanitary Corps they would have been entitled to ranks varying from second lieutenant to major.

These 40 psychological appointees, 16 in the Sanitary Corps and 24 under civil appointment, have served the Army faithfully and under extremely difficult conditions, working long hours and often 7 days in the week, with almost no reward, for the War Department's disapproval of requests for additional grades and appointments has, with a very few exceptions, prevented promotions.

In view of these circumstances it seems unreasonable to expect these original appointees and the 35 psychologists who were appointed in the Sanitary Corps during the first three months of the present year to continue to serve efficiently and contentedly. It is clearly the duty of the War Department either to provide for their normal promotion, as in the case of any other military group, or to order psychological service discontinued and request that these officers either choose other service or resign.

Approximately half of the officers now in the psychological service have already been recommended by the Division of Psychology for promotion. Many of these recommendations were made early in April, 1918, but it has thus far been impossible for the division to secure the necessary authorization for favorable action.

The situation with respect to enlisted psychologists is even less satisfactory. When the School for Military Psychology was organized it was with the definite understanding that 132 psychologists could be commissioned in the Sanitary Corps in accordance with authorization of the Secretary of War dated January 19, 1918. A copy of this authorization, which was written as fifth indorsement to recommendation from the Surgeon General for extension of psychological work, together with plan of the medical department for securing necessary psychological personnel, is attached to this letter. At the time of the organization of the school, February, 1918, psychologists were being commissioned as rapidly as possible but owing to professional obligations there were many delays in securing competent men, consequently the entire number of 132 was not secured at once, but arrangements were made by which groups of either 25 or 50 commissioned or enlisted men could be sent to the School for Military Psychology at Fort Oglethorpe. It was definitely understood by the Division of Psychology that these men could and should be recommended for promotion to noncommissioned or commissioned appointments according to their performance in the training school. No definite promises were made to individuals, but the understanding between the Surgeon General's Office and the students involved was perfectly definite and is clearly justified by the assurances which had been received from the War Department.

Between February and July, 1918, approximately 250 carefully selected men accepted voluntary induction for training in military psychology. Thus far approximately 50 of these men have been highly recommended for promotion to commissioned appointment. They are among the ablest young men in the Army. They came into the service by special invitation and because of special qualifications for a kind of work which the Secretary of War had ordered. They have been cut off from opportunities for promotion and used as privates or noncommissioned officers for work which should be done by commissioned officers. It is so obviously unfair to these young men to have them continue in their present work without promotion that the War Department should immediately authorize additional appointments in the Sanitary Corps, psychological service.

A further pertinent consideration with respect to psychological appointments is this: suitable candidates for commissioned appointments are available in the psychological service. They are highly trained and it is merely a case of promoting them according to value to the service and merits. It is believed that this is a much more pertinent argument for the creation of additional appointments for psychological work than any other except the urgent need and demand by line officers for various kinds of psychological service.

Assurance may also be given to the War Department that the men in the psychological service, both enlisted and commissioned, are of such native ability, education, and military experience that with few exceptions they can be used effectively in other services should the need for them in the psychological service disappear. The majority of them would make efficient personnel adjutants, others would render admirable service as hospital adjutants, many are fitted and eager for line service. Recently one commissioned psychologist has been transferred to the Tank Corps and is serving as personnel officer; a second was recently requested by his commanding officer to accept transfer to the infantry and promotion to the rank of major in order that he might be placed in command of the development battalion in his camp. There are several officers in the psychological service equally well fitted for such military responsibility.

The Army need have no misgivings about the military usefulness of the 350 men who have been recruited and trained for psychological service, for, in the first place, they have been carefully selected on the basis of personal quality, mental ability, and professional training; in the second place, they have been given from two to four months of intensive military training and training in military psychology at Fort Oglethorpe.

10. The psychological service has now developed to an important extent in several different directions. These are merely enumerated below, but the accompanying memoranda more or less adequately illustrate the significance:

(*a*) Psychological examining of drafted men by groups in order that an intelligence rating or mental grade may be assigned every soldier for use by personnel adjutant, company commander, or such other officer as has need of it (see W. D. Scott letter attached).

(*b*) Classification of soldiers on the basis of mental ability so that promising material for noncommissioned officers may promptly be selected and that satisfactory candidates for officers' training camps may be chosen. The evidences of the selectional value of mental grades are now convincing.

(*c*) Service in development battalions in connection with the rating of men, measurement of their response to training, and development and control of morale.

(*d*) Assistance to judge advocate in connection with court-martial cases in order that the courts may be provided with adequate and reliable information concerning the mentality of a man before sentence is passed. This is particularly important in connection with men of low-grade mentality and conscientious objectors. Grave injustices are frequently done by sentencing men irrespective of their degree of intelligence and responsibility. In various camps the judge advocates are at present availing themselves of the assistance of psychologists.

(*e*) Psychologists are prepared to assist with the development and control of morale in training camps. Not all are especially qualified for this kind of work, but they should on the whole be able to understand more fully than any other single group of officers the mental factors underlying morale and to deal effectively with many of the serious problems arising in connection with unsatisfactory camp conditions. Germany is using psychologists most effectively in this field.

(*f*) Assistance to neuro-psychiatric or other medical officers in the examination of cases of suspected imbecility, moronity, or affective deficiency has been rendered by psychologists in many camps during the past six months. This service is of such nature that the neuro-psychiatrists are eager to have it continued. It is in no sense a duplication of their work.

The methods of psychological work especially developed for the benefit of the United States Army have aroused interest in France and England, and undoubtedly in Germany also. England, chiefly because of American initiative, has recalled her chief psychologists from other arms of the military service and has initiated various lines of psychological work.

Up to the present moment approximately 1,100,000 men have been given mental examination in the United States Army. Some 41,000 of these have been examined individually. The percentage of soldiers found to be mentally unsatisfactory, aside from the cases of pathological mental condition dealt with by neuro-psychiatrists, is less than one-half of 1 per cent, and under existing conditions not more than half of this number need be discharged from the Army, since development battalions and labor organizations provide for the special study, assignment, and use of men who would be serious nuisances if placed in organizations for regular military training.

No single criticism or complaint concerning psychological work has been more frequent than the charge that it results in the rejection or discharge of too many soldiers. This complaint is entirely without foundation. It arises from the confusion of psychological work with neuro-psychiatric work. Psychologists discharge no one. They merely report the mental grade of a soldier to designated officers, chief of whom are the personnel adjutant, the soldier's commanding officer, and the medical officer. As a matter of fact relatively few men, certainly well under one-quarter of 1 per cent have been rejected or discharged because of, or partly on account of, report of psychological examination.

There is persistent misunderstanding of the primary purpose of psychological examining, which is the proper placement of every soldier in the service, and not his rejection from the service. The main interest of psychological officers is in increasing the human efficiency of the Army and in finding the proper place for every soldier who has sufficient intelligence to labor effectively.

For the Surgeon General:

S. J. Morris,
Lieutenant Colonel, Medical Corps.

Under date of October 1, 1918, the Surgeon General was notified by the following indorsement of favorable action concerning request for additional psychological personnel:

[Second indorsement.]

War Dept., A. G. O., October 1, 1918.—To the Surgeon General.

1. Under authority conferred by the act of Congress, "Authorizing the President to increase temporarily the military establishment of the United States," approved May 18, 1917, and July 9, 1918 (public 193), the President directs that, for the period of the existing emergency, the medical department, Sanitary Corps, be increased by 1 lieutenant colonel, 14 majors, 14 captains, 28 second lieutenants. The officers hereby authorized will be obtained as provided in the third paragraph of section 1 and by section 9 of the act of May 18, 1917.

2. The number of first lieutenants will be decreased from 57 to 31; this decrease to be accomplished as follows: no vacancies in the grade of first lieutenant shall be filled until the number has been decreased, by promotion or otherwise, below 31. No vacancies thus created above the grade of first lieutenant shall be filled, except by promotion, until the number of first lieutenants has been reduced to 31.

3. The authorization above is for the purpose of providing personnel for the Psychology Division of the Sanitary Corps, medical department, as set forth in the accompanying table, marked "G 1."

By order of the Secretary of War:

H. B. CREA,
Adjutant General.

TABLE G 1.—*Personnel required by Sanitary Corps, medical department, Division of Psychology.*

	Authorized May 16, 1918.							Recommended by Surgeon General, July 9, 1918.							Total recommended October, 1918.						
	Colonels.	Lieutenant colonels.	Majors.	Captains.	First lieutenants.	Second lieutenants.	Total.	Colonels.	Lieutenant colonels.	Majors.	Captains.	First lieutenants.	Second lieutenants.	Total.	Colonels.	Lieutenant colonels.	Majors.	Captains.	First lieutenants.	Second lieutenants.	Total.
Reconstruction hospitals	...	...	...	...	4	...	4	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Medical officers' training camp (Camp Greenleaf)	...	...	1	1	...	...	2	...	...	1	1	2	...	4	...	...	1	3	...	...	4
Camps, National Army and National Guard	...	...	...	14	53	...	67	...	...	16	30	35	31	112	...	...	14	27	31	28	100
Depots and psychiatric stations	...	...	...	...	...	...	...	...	...	1	10	5	...	16	...	...	...	...	...	...	...
Surgeon General's office	...	...	2	1	1	...	4	1	1	2	1	...	...	5	...	1	2	1	...	...	4
Total	...	...	3	16	58	...	77	1	1	20	42	42	31	137	...	1	17	31	31	28	108
Total heretofore authorized	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	17	57	...	77
Increase recommended October, 1918	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	14	14	−26	28	31

Thus ended happily the persistent attempts of the Division of Psychology to secure authorization for the essential officer personnel. The official communications tell the story of initial approval, subsequent disapprovals, and, finally, return to favorable action; but they do not adequately indicate the bases for this surprising trend of events. Intimate knowledge of the situation enables the chief of the Division of Psychology to state that there was seldom, if ever, anything which could be characterized as personal. The service suffered from its newness, its peculiar sort of novelty, from persistent confusion with neuropsychiatric work, from other natural misunderstandings, from reasonable scepticism concerning practical value, and, finally, from the investigation prematurely made by the committee on organization.

SECTION 4.—*General Orders covering psychological examining.*

It has already been pointed out on page 29 that general orders concerning psychological examining were not issued by the War Department during the important period of extension of examining. Indeed, not until August 14, 1918, were essential directions placed in the hands of commanding officers by the War Department.

The orders finally issued were modified from those prepared by Col. Burt as a result of his thorough investigation of psychological examining:

WAR DEPARTMENT,
Washington, August 14, 1918.

General Orders, No. 74.

VII. The Psychological Division shall be primarily established in the office of the Surgeon General, the School for Military Psychology, Fort Oglethorpe, Ga., at those points where depot brigades are or will be established, and at Camp Humphreys, Va. In addition the Surgeon General shall maintain at the school of training for psychological

personnel, Fort Oglethorpe, Ga., a reserve, trained and in training, composed of officers and enlisted men. Such reserve will be called upon to furnish, under direction from the Chief of Staff, psychological personnel, either permanently or temporarily, for such other points and at such times as necessity for the same may arise.

Chiefs of staff corps, department commanders, and commanding officers of posts or stations may make official requests for permanent or temporary psychological personnel for detail at schools, camps, or stations as necessity arises.

Psychological examinations of line officers will be made only on the recommendations of commanding officers, and of officers of staff corps, upon request of the respective chiefs of staff corps.

Psychological examinations for all candidates for officers' training camps will be held where sufficient psychological personnel is present and where time may permit the results of such examinations to be placed in the hands of organization commanders before final recommendations on candidates are made. These results will be used only as assisting guides in making selections. No particular psychological rating shall be declared as the minimum to be attained by any such candidates. Directors of training camps may request that psychological examinations of students be held where ratings may be deemed of value.

Such recruits arriving at depot brigades or other points where Psychological Division is established as may, in the opinion of the commanding officer, require such examination, will be examined psychologically and during their two weeks' period of quarantine only. Subsequent to that period such examination will be held for groups when necessary, and individually, by direction of commanding officers as they shall nominate. Organization commanders and camp or post surgeons where psychological examiners may be present will recommend when necessary that special examinations of particular cases be held.

Under direction of cantonment commanders any special branch or office of the cantonment organization may request the assistance of a psychological examiner where it is deemed his service would be of value. Commanding officers of development battalions will requisition for these examiners whenever necessary.

Commanding officers other than cantonment commanders may make requisition for psychological examiners from time to time as necessity arises.

Camp or post surgeons under whose jurisdiction the psychological personnel shall fall will be responsible to their respective commanding officers that the examinations are properly held; that psychological examiners reduce the time occupied in individual examinations to the lowest practicable minimum, in the majority of cases, by questioning and by personal observation solely, particularly where recommendation for transfer to a development battalion is the obvious solution, and that they resort to detailed standard psychological tests only in the more doubtful cases; that the reports of examinations be promptly made; that judicious coordination be established between the psychological and psychiatric divisions to the end that the facilities of both may be used to obtain the most prompt action on low mentality cases.

Psychological reports where ratings only are given will be forwarded to personnel adjutants for their use in connection with other qualification card information in allotting recruits to organizations and further by such adjutant to proper organization commanders for the information of the latter. If this be without the depot brigade the ratings should accompany the men concerned wherever practicable. The information thus conveyed will be considered as an assisting and accelerating guide to commanders in assigning their men for particular duties and in training. Attention is here invited to the fact that it may be possible for regimental commanders to perfect and produce well-balanced organizations by judicious use of psychological ratings, at time of incoming large drafts and in connection with the assignment of men to companies; and possibly by company commanders, by special grouping with the idea of speeding up training.

Where, in addition to ratings, psychological reports recommend discharge, individual examination or assignment to development battalions, camp or post surgeons, under direction of commanding officers, will provide for special examinations of the individuals so reported, before disability boards. Such disability boards shall be composed of medical officers not all of whom shall be of any one class of specialists, as for example, psychiatrists, and in addition wherever practicable, of one experienced line officer.

Psychological reports shall be placed in the hands of organization commanders at the earliest practicable date, in order that their ratings may be made of value.

In special cases, where time does not permit that complete individual examinations be made, psychological examiners will make for the information of the surgeon and personnel officer, some such provisional qualification card report as "illiterate" or otherwise, as the case may be.

Under direction of commanding officers, the psychological personnel present will be supplemented when necessary by enlisted members of the Medical or Sanitary Corps, who shall remain on psychological duty only in the rush of examination of large groups and while making up rush reports on the same.

Commanding officers shall provide quarters for the psychological division while bearing in mind that their principal need is for one or two large rooms to hold groups of approximately 100 men during examinations. If need be the commanding officers of base or other hospitals will be called upon for temporary space, or directors of the Y. M. C. A.'s temporarily, where no other space is available. Minor office space and individual examination rooms will be furnished in available situations. Centralization of the psychological division in post or cantonment is desirable but not obligatory. If necessary, tentage will be used.

When deemed for the benefit of the service at large, the Surgeon General may request that commanding officers of stations where psychological examinations have been held, be called upon for recommendation toward the improvement of the psychological division and its service.

The Surgeon General may transmit direct to camp or post surgeons such technical instructions covering the psychological division as he may desire. All such communications will be laid before the commanding officers concerned for their information.

None of the above instructions shall apply to the Division of Military Aeronautics.

[702, A.G.O.]

By order of the Secretary of War:

PEYTON C. MARCH,
General, Chief of Staff.

Official:
H. P. MCCAIN,
The Adjutant General.

This order was unsatisfactory to the Division of Psychology chiefly because it made the psychological examining of enlisted men optional with commanding officers. Fortunately for the service psychological staffs were so well organized in almost all camps and the service so well established on its merits when this order arrived that in only two or three instances was there an attempt to restrict the examining of enlisted men. It nevertheless seemed desirable, if the service were to be continued on a satisfactory basis throughout the Army, that the order should be thoroughly revised in the light of the information available in the Office of the Surgeon General and in accordance with demonstrations of value. Consequently on November 4, 1918, a request for a revised order was presented by the Division of Psychology to the Surgeon General. This request was never forwarded to the Adjutant General of the Army because of the signing of the armistice.

The proposed revision of the general order is presented in full in order to exhibit the relations, conditions, and instructions which the staff of the Division of Psychology deemed essential for the efficiency of the service:

NOVEMBER 4, 1918.

From: The Surgeon General, U. S. Army.
To: The Chief of Staff.
Subject: Revision of General Orders, No. 74, War Department, 1918.

1. It is requested that section VII, General Orders, No. 74, War Department, 1918, be rescinded, and the following substituted therefor:

"1. A Division of Psychology shall be established in the Office of the Surgeon General.

"2. A school for military psychology shall be established at Camp Greenleaf, Ga., to supply adequately trained personnel for the administration of mental tests in the Army. In this school the Surgeon General shall maintain a reserve, trained and in training, composed of officers and enlisted men. Such reserve will be called upon to furnish, under the direction of the Chief of Staff, psychological personnel, either permanently or temporarily, for such points and at such times as need may dictate.

"3. The army mental tests will be administered in all cantonments, camps, or other points at which drafted men are received, physically examined, and either temporarily or permanently assigned to organizations. Psychological personnel will be assigned to other army training stations or posts as and when needed. Chiefs of staff corps, department commanders, and commanding officers of posts or stations may make official request for permanent or temporary assignment of psychological personnel as seems necessary.

Under direction of cantonment or camp commanders, any special branch or office of the cantonment or camp may request the assistance of a psychological examiner where it is deemed his services will be of value. Commanding officers of development battalions will requisition for such examiners as necessary.

"4. All officers below the rank of field officer will be given the army psychological test for officers, and the mental rating thus obtained will be entered on the officer's qualification card.

All candidates for officers' training camps will be given the army mental tests and the ratings thus obtained will be placed in the hands of organization commanders before final recommendation of candidate has been made. The mental rating will be used as an assisting guide in selection.

All recruits arriving at depot brigades or other receiving stations at which physical examinations are made, will be given the army mental tests. This will be done as promptly as feasible after a man has arrived, and in any event prior to physical examination and accomplishment of qualification card by personnel officer.

"5. A mental rating for every recruit shall be reported within 24 hours of examination to the personnel adjutant. This rating shall be entered promptly on qualification card and service record, and shall be made permanently available to personnel adjutant and commanding officers.

All recruits who receive a mental rating below D as a result of group army mental tests, shall promptly be given individual army mental examination by psychological officers. The mental rating obtained in such individual examination shall be reported promptly to the personnel adjutant.

All recruits rated in individual examination below D, and in addition all for whom special neuro-psychiatric examination is indicated as desirable, shall be immediately reported, either directly or through the personnel adjutant, to the neuro-psychiatrist.

"6. The commanding officer of cantonment, camp, post, or other station in which mental tests are administered, shall see that suitable building or necessary space for proper conduct of this work is provided. At those points where depot brigades are established it is essential that a special building with space equivalent to that of small barracks building be made available. Commanding officers of cantonments or camps may requisition special psychology building if necessary. This should not be done where available building can be assigned and suitably adapted to psychological needs by minor alterations. The psychological building or allotted space should be located near the point of physical examination, personnel classification and assignment.

"7. Psychological staff shall be composed of officers of the Sanitary Corps and enlisted men of the Medical Department, trained in military psychology.

Under direction of commanding officers the psychological personnel present will be supplemented when necessary by enlisted men drawn from such organizations as can best spare them. These enlisted men who are temporarily assigned shall remain on psychological duty only during the examining of large draft quotas and while rush reports are in preparation.

Psychological staff shall be attached to the camp or other station, not to the Division. It shall be under the control of the chief medical officer, and will be suitably quartered by him.

"8. It shall be the duty of the chief psychological examiner to see that a reliable mental rating is secured and reported for every recruit and every officer below the rank of field officer. In addition the chief psychological examiner shall, so far as possible, render special service to medical officers, to judge advocates, to commanding officers of organizations, to morale officers and educational directors by making special examination of individual cases or groups referred for examination and report.

"9. The mental rating of officers or enlisted men shall be considered in connection with assignment, promotion, demotion, rejection, discharge, or court sentence. It shall be used by the personnel adjutant to assist in selecting men of adequate intelligence for a given type of organization, to secure an adequate level of intelligence in different organizations, to guarantee the immediate rejection or discharge of men whose intelligence is so inferior that they can not be used in the Army, to assist in the prompt assignment of men of inferior intelligence to development battalions or labor organizations, to safeguard the interests of the individual and assist the judge advocate in connection with court-martial proceedings.

"10. When deemed for the benefit of the service at large, the Surgeon General may request that commanding officers of stations where psychological examinations have been held be called upon for recommendation toward the improvement of the psychological division and its service.

The Surgeon General may transmit direct to camp or post surgeons such technical instructions covering the psychological division as he may desire. All such communications will be laid before the commanding officers concerned for their information."

2. This revision of General Orders No. 74 is necessary, first, because the order is not interpreted uniformly in different camps, and second, because it does not provide for the examining of officers and of all enlisted men.

Instructions issued by the Adjutant General of the Army, October 8, 1918, require that the intelligence rating of an officer be made available to the personnel board in its review of the qualifications of the officer when he is summoned by said board. The examining of officers below the rank of field officer is necessary in order that intelligence rating may be supplied.

Paragraph 5 of General Orders No. 74 as originally approved by the Surgeon General and by the General Staff reads: "All recruits arriving at depot brigades or other points where the psychological division is established, will be examined psychologically * * * ," etc. This was subsequently changed as a result of misunderstanding of the nature and purpose of psychological examining to read: "Such recruits arriving at depot brigades or other points where the psychological division is established, as may in the opinion of the commanding officer, require such examination, will be examined * * *," etc. This alteration is extremely unfortunate in its effect because it renders uncertain the availability of the intelligence rating of an enlisted man.

All camps and cantonments in which psychological service is organized have issued orders requiring that the intelligence rating be entered on the service record and the qualification card.

SECTION 5.—*Provision of buildings for psychological service.*

In preparing plans for the extension of psychological examining, following the request of the Secretary of War, dated December 21, 1917, the staff of the Division of Psychology sought the advice of various officers of the General Staff and the Medical Department, and in accordance therewith requested that a special building for psychology be constructed in each training camp (pp. 27–29).

That this request seemed reasonable to the committee of the General Staff which prepared the recommendation, is indicated by the last paragraph of the approval, which reads:

The Quartermaster General will construct the necessary building at each cantonment for the Examining Board in Psychology, furnish the necessary plain furniture for these buildings, in accordance with plans and specifications submitted by you.

Following this indorsement, and in accordance with the general plan which had been approved, the Division of Psychology completed a detailed plan and description of the proposed psychological building. The plans were submitted to the Division of Hospitals, Office of the Surgeon General, which prepared and forwarded to the Office of the Quartermaster General, construction department, the necessary blueprints. While this work was in progress Maj. Yerkes proceeded in accordance with authorization of the hospitals division to secure tentative designation of location for building in each camp. To this end the following letter was dispatched to division surgeons:

JANUARY 24, 1918.

From: The Surgeon General, U. S. Army.
To: The Division Surgeon, Camp ———.
Subject: Location of psychology building.

1. The War Department has approved plans for the psychological examining of company officers and all newly drafted and enlisted men in indorsements copies of which are attached.

2. In order that these examinations may be properly conducted a special building is to be provided by the Quartermaster General in each divisional training camp. The proposed building will be 120 feet long, 30 feet wide, two-story, as per rough sketch inclosed. [Plans for this building are shown in the Examiners' Guide, pp. 197 ff. of this volume.]

3. Psychological examining will be conducted under direction of the division surgeon. The results will be reported to him, to division headquarters, and, as desirable, to the commanding officer of the base hospital.

4. In the opinion of this office it is important that the building for psychology be located near division headquarters, and if possible between division headquarters and the base hospital. Where there is no available space close to division headquarters it will probably be preferable to seek a location near the base hospital.

5. You are requested, in consultation with the commanding general of the division and the camp quartermaster, to select what would appear to be a suitable site for the proposed building and to advise this office at the earliest possible moment, attention Maj. Yerkes, Division of Psychology, concerning decision.

6. It is desired that the site selected be so designated that satisfactory directions may be given to the constructing quartermaster from this office.

7. If additional information is desired or uncertainties develop you will address the Division of Psychology, this office.

By direction of the Surgeon General:

ROBERT M. YERKES.
Major, Sanitary Corps.

As a result of this letter suitable location was selected and designated by the commanding general in almost all of the camps and cantonments, but before this information could be used action by the General Staff, reported below, rendered it irrelevant.

In order to expedite preparation of plans, estimates, and all necessary preliminaries to construction, Maj. Yerkes kept in touch with the Division of Hospitals of the Office of the Surgeon General and with the construction department of the Office of the Quartermaster General. With everything in readiness for construction, the Acting Quartermaster General on February 5, 1918, addressed the following memorandum to the Chief of Staff:

FEBRUARY 5, 1918.

Memorandum:
From: The Acting Quartermaster General.
To: The Chief of Staff.
Subject: Psychological buildings for National Army cantonments and National Guard camps.

1. Attached hereto is request from the Surgeon General of the Army requesting the construction of a psychological building at each National Army cantonment and each National Guard camp.

2. The following instructions in reference thereto have been given by the Secretary of War to the Quartermaster General:

You will establish at each cantonment a building for the use of the psychological examining board and furnish the necessary benches, tables, etc., in accordance with plans submitted by the Surgeon General. The estimated cost of each building, including furniture is $12,000, and funds for this purpose will be charged to the deficiency authorized by the Assistant Secretary of War.

3. Later advice from the Surgeon General is that one of these buildings is desired at each divisional camp.

4. It is estimated that the cost of this construction for 16 cantonments and 16 National Army camps will be: Construction and repair of hospitals, $368,000; supplies, services, and transportation, $16,000. Funds are not available under the appropriation "Construction and repair of hospitals," but this amount has been included in the deficiency estimate submitted to Congress for inclusion in the urgent deficiency bill now pending. Funds required under "Supplies, services, and transportation" can be charged to the amount authorized as a deficiency by the Assistant Secretary of War on December 14, 1917.

5. The Surgeon General urges the construction of these buildings as a war necessity, for the mental examination of men before going to over-sea duty, and authority is therefore requested to proceed with the work.

6. Return of the original papers to this office for its records is requested when action is taken.

GEO. W. GOETHALS,
Acting Quartermaster General.

This memorandum went to the equipment committee of the General Staff, which, after consideration of the matter, recommended "disapproval of the construction of special buildings until such time as funds may be made available for this construction by act of Congress." Official notice of disapproval was sent to the Surgeon General, February 14, 1918.

On receipt of this information it was learned through conference with War Department officials that the equipment committee deemed it wholly feasible and desirable that psychological examining be done in hospital buildings, as originally, instead of in buildings especially constructed for this purpose. This fact was presented to the Surgeon General who promptly disapproved the continued use of hospital wards for psychological purposes on the ground that they should at all times be available for medical purposes. Thereupon, in accordance with the desires of the Surgeon General, the Chief of the Division of Psychology prepared for his signature the letter which follows:

FEBRUARY 14, 1918.

From: The Surgeon General, U. S. Army.
To: The Adjutant General of the Army.
Subject: Expenditure for psychological building in each divisional training camp.

1. Disapproval by Assistant Secretary of War, on recommendation of General Staff, of deficiency expenditure amounting to $384,000 for psychology building in each National Army and National Guard camp, is acknowledged with the following information:

2. Reversal of decision of General Staff concerning plan for psychological examining and recommendation that the work be conducted in base hospitals instead of in special building is evidently based upon serious misunderstanding of requirements and relations of psychological work and practical availability of hospital space.

3. The base hospital space, as extended by recent action, is provided and required for medical purposes. It can not, in fairness to the health of the Army, be assigned permanently for psychological use.

4. Temporary assignment of requisite base hospital space for psychological examining is, in the opinion of the Medical Department, both undesirable and wasteful (1) because the conduct of said work in accordance with plan originally approved and fully authorized by the Secretary of War will require special furnishing of two large hospital wards (or one of the prospective two-story hospital buildings), this special furnishing as per specifications originally submitted is in a large measure built in, consisting of benched tables nailed to floor, platforms, shelves, etc.; (2) because the cost of adequate and appropriate base hospital space would be at least $20,000 as contrasted with $12,000 expenditure for special building.

Obviously even should medical requirements permit it, it would not be economical to use base hospital space for psychological use. Only dire necessity would, in the opinion of the Medical Department, justify the recommendation of the General Staff that this extremely important new work be suspended until Congress authorizes necessary expenditure for provision of special building.

5. In accordance with authorization originally given by the Secretary of War the Division of Psychology, this office has proceeded (*a*) to secure personnel of 132 commissioned officers, 124 noncommissioned officers, and 620 enlisted men; (*b*) to establish school for special training in military psychology at Medical Officers Training Camp, Fort Oglethorpe, Ga.; (*c*) to devise and perfect the necessary methods of work and to secure requisite apparatus and printed materials for the examining of 500,000 soldiers. At the present time work along these several lines is well advanced. Approximately 60 men have been commissioned for psychological service. Approximately 50 have been enlisted in the same service. An enlisted company and also a commissioned company are in training at Fort Oglethorpe. A large portion of the materials necessary for contemplated work has been requisitioned.

Attention is called to the fact that the labors of the Division of Psychology and the expenditure thus far entailed will be in a large measure wasted unless the essential features of the original plan of work are fully approved by the War Department.

6. Psychological examining was originally conducted at base hospitals in order that its military and medical values might be demonstrated to the satisfaction of line and medical officers. This was accomplished. There resulted unqualified and enthusiastic approval and endorsement of this work by line and staff officers as well as by medical officers. On the basis of this endorsement (most strongly expressed by the War College Division of the General Staff in memorandum for the Chief of Staff as follows: "The results of these examinations were very remarkable * * *. This subject of Psychology in its relation to military efficiency is an entirely new one and the War College Division approached it with a good deal of doubt as to its value. A very thorough study of the reports submitted, however, has firmly convinced us that this examination will be of great value in assisting in determining the possibilities of all newly drafted men and all candidates for officers training camps") and of the unqualified approval of the Surgeon General's plan for the extension of psychological work, the Division of Psychology has proceeded expeditiously and

in accordance with good business principles with all preparations necessary for bringing the plan into effect at the earliest possible moment.

7. The prospective psychological work is not what has been done. Instead it provides for more varied and important applications of the methods of psychological examining and of their results. For this reason the inference of the General Staff that this work can very well be done, at least temporarily, in base hospitals is incorrect. As a matter of fact, even were base hospital space temporarily devoted to this work, it would have only a fraction of the value to the Army which would result if the work were done as planned in special building adjacent to division headquarters.

8. Psychological examining is not a temporary bit of work but, as planned, continuous throughout the period of use of a divisional training camp. The results of the work are especially important in connection with those of the personnel office in each camp. The strictly medical reference and significance of psychological reports are quite overshadowed by their military significance. All psychological records for this reason should be conveniently accessible to company, regimental and other commanding officers, and the psychological staff should be centrally located in the camp for purposes of consultation with line officers. The work obviously is related most directly and importantly to division headquarters. It has no special or necessary connection with the base hospital, and even if most adequately housed in or about the base hospital, it could not be conducted there without sacrifice of certain of its most important values. Maj. Yerkes, of the Division of Psychology, has stated that in his judgment this sacrifice would probably amount to one-half of the prospective value.

9. It should further be emphasized that the proposed psychology building is to provide not for the examining of an occasional individual but instead (*a*) for general psychological and psychiatric surveys of all enlisted men and company officers in every divisional training camp; (*b*) for thorough psychological or psychiatric examination of each man for whom such study is indicated as desirable for military, medical or social reasons; (*c*) for conferences between psychologists and line and medical officers concerning problems of human behavior and mental characteristics which directly affect military efficiency; (*d*) for such instruction concerning the relations of psychology to military activities as is deemed desirable by the division commander and his staff; (*e*) for discussion of problems of reeducation and rehabilitation, nervous instability or liability to shock, feeblemindedness, malingering, etc. In brief, the psychology building is planned as a center for the study, under the direction of the division surgeon and the commanding general, of all problems of human behavior and mental fitness which arise within the camp community.

Without such a building most of these proposed purposes provided for by the plan originally approved by the General Staff can not be achieved. The medical department therefore submits that since this work is important to the efficiency of the Army, and should, in accordance with the opinion of the General Staff already forcibly expressed, be conducted for the entire Army, the important provision of special psychological buildings is an imperative necessity.

10. The General Staff, having approved an extremely carefully prepared plan in which only essentials were asked for, subsequently and after a period of nearly a month disapproves one special and fundamentally important item of said plan. The medical department must direct attention to the result. This partial disapproval practically destroys the value of the original plan for the extension of psychological examining. Had special building been disapproved originally a new plan would have been prepared by the Surgeon General's Office for consideration of the General Staff.

The Division of Psychology stands ready to do its utmost to assist the Army whatever the difficulties or inconveniences, but unless the psychological building can be provided immediately the success of this work, in accordance with reasonable predictions of the medical department and expectation of the General Staff, is jeopardized. The medical department has been placed in the false position of being forced to attempt to carry into effect what it considers an excellent plan, which after initial complete approval has been emasculated.

11. Finally, the medical department is compelled to disapprove recommendation of the General Staff that psychological work be conducted at base hospitals. The plan for provision of special psychology building is urged as necessary for achievement of results which the Army has a right to expect and demand in view of expenditures already made for psychological service. These results are briefly such as the following: (*a*) the discovery and discharge of those who are seriously mentally defective; (*b*) the proper assignment within the Army of men of low-grade intelligence so that the time of officers in attempting to train them beyond their capacities shall not be wasted; (*c*) assignment of men so that organizations shall have adequate mental strength and similar organizations, as for example regiments of infantry, approximately equal mental strength in order that there shall be no seriously weak points in the line; (*d*) assistance in selection of men intellectually competent to command (officer material); (*e*) selection of men for special kinds of military service, as for example service which requires unusually good vision, hearing, quickness of reaction, etc.; (*f*) the special study of individuals referred to psychologists by camp officers and of any psychological military problems which are formulated by divisional officers and presented to the psychological staff.

12. This work is new as was pointed out by the War College Division of the General Staff. The medical department in originally undertaking to test its value accepted a risk. Having obtained adequate evidence of remarkable military value, it presented a definite and extensive plan. It now submits that there is every reason to believe that this plan should be carried out to the letter and that the prospective value of psychological work is so great as to justify deficiency expenditure for psychological building in each divisional training camp. Every division that goes abroad without psychological survey and without thorough individual psychological examination of intellectually weak individuals carries with it many men, perhaps even as many as one per cent, who are not worth their transportation for military purposes.

It is requested that the facts submitted in connection with disapproval of psychology building be given earliest possible consideration by the General Staff in order that waste of effort and expenditure may so far as possible be avoided and the Division of Psychology, Surgeon General's Office, enabled to fulfill the reasonable anticipation concerning its services to the Army.

W. C. Gorgas,
Surgeon General, U. S. Army.

The recommendation of the above letter was disapproved by the War Department on February 19. This disapproval left the medical department no choice but to provide for psychological examining in hospital wards, and as such provision was deemed inexpedient the Surgeon General promptly arranged to place the matter before the Secretary of War. This was done on February 23 with emphasis of the fact that existing camp buildings might perfectly well be utilized for psychological examining if made available. The Secretary of War stated that, in his opinion, buildings were available in most camps and that he would institute inquiry concerning the matter.

The outcome of this inquiry and of instructions issued on the basis of information was that in the majority of National Army cantonments suitable barracks buildings were assigned for the use of psychological examiners and that in National Guard camps more or less satisfactory temporary arrangements were made. The conditions varied extremely in the different camps but in very few was the housing arrangement equal to that which the War Department had originally authorized. It was assumed, however, that funds would shortly be made available by Congress for the new construction and that in the meantime psychological examining might go forward under difficult conditions.

After the passage on March 28 of the deficiency expenditure bill, which was supposed to have carried an item of $384,000 for psychological buildings, the Division of Psychology, on the assumption that funds had been made available, recommended the construction of buildings in camps which most needed them. This recommendation was met by the information both from the construction department of the Quartermaster Corps and from the equipment committee of the General Staff that the funds had not been made available for this special construction and in consequence it could not be authorized. The Division of Psychology, therefore, prepared to make the best of an extremely unfavorable situation. However, in the summer an officer of the coordination section of the General Staff, in searching for information concerning various matters pertaining to psychological examining, discovered that funds actually had been appropriated by Congress in the deficiency bill of July 8 for the construction of special buildings to facilitate psychological examining, although no official information had been received by the division. The chief of the Division of Psychology referred this report to the construction department of the Quartermaster Corps for confirmation, which was supplied. Thereupon the medical department recommended the construction of special buildings for psychological examining in several camps. On November 11, 1919, several buildings had been authorized by the War Department, but so far as is known none had been constructed except the one early provided for special instructional purposes at the school of military psychology, Fort Oglethorpe, Ga.

The failure of the War Department to provide special buildings for psychological purposes in accordance with original plan and authorization proved a most serious handicap. The practical value of this work to the Army was undoubtedly seriously lessened by the unsatisfactory facilities temporarily provided in lieu of special examining buildings.

Once more misfortune occurred where it could least well be sustained. Undoubtedly difference in point of view, misinformation, misunderstanding, and inadequate appreciation of both the demands and values of psychological examining were chiefly responsible for the unfortunate series of events which constitute the history of buildings for psychology in army camps. It is quite clear that, except for certain misunderstandings in the General Staff, the buildings would have been provided promptly. It is equally clear that they would have been provided eventually in spite of objections had it not been for delay in the appropriation of funds.

In accordance with the original plans of the Medical Department special buildings should have been ready for this work not later than April, 1918, but as a matter of fact it was October before the difficulties were so far overcome as to guarantee construction even where buildings were most sorely needed.

The housing facilities for pyschological examining provided in the various camps are briefly described in Section 6 (infra) on camp organization. The situation in the several camps may be indicated briefly. The special building was constructed in Camp Greenleaf. (Supply company barracks, such as were used in many camps, are shown in pl. 4, A and B, and pl. 6 A, this volume.) A reasonably adequate barracks building or part thereof was provided in Camps Bowie, Dodge, Funston, Grant, Humphreys, Jackson, Lewis, Meade, Pike, Sherman, Taylor, Travis, and Upton. Other types of building, less suitable, were provided in Camps Custer, Devens, Dix, Lee, and the majority of the National Guard camps.

SECTION 6.—*The organization of examining in camps.*

CAMP ORGANIZATION.

The efficient organization of psychological examining in a large training camp was an administrative undertaking of considerable magnitude and difficulty. The chief psychological examiner was held responsible for the following important tasks: (*a*) The organization of an adequate and efficient staff; (*b*) the training of a reliable clerical force at the strength required by the camp; (*c*) arrangements for suitable space and equipment for conduct of examinations; (*d*) arrangement of schedules of examining and for system of reporting results; (*e*) establishment of profitable cooperative relations between the psychological staff and the personnel adjutant, the headquarters staff, medical officers, and the commanding officers of the principal camp organizations; (*f*) familiarizing officers of the camp or division with the nature and use of intelligence ratings and with the possible values of psychological service to the organizations; (*g*) organization of methods of classifying, filing, and storing data of examinations; (*h*) the discovery and development of new lines of service and the maintenance of a state of preparedness to respond to all reasonable requests for special help. No commanding officer in the psychological service complained that his work was too easy or that it lacked interest. On the contrary, there was extreme eagerness and enthusiasm for this new kind of administrative work and remarkable success was achieved by many chief psychological examiners.

The following general scheme of staff organization was proposed on the basis of inspection of camp conditions: (1) Chief psychological examiner, responsible for general administration, correspondence and camp contacts; (2) clinical psychologist, responsible for direction of individual examining, neuro-psychiatric contacts and the study of the success of low grade men; (3) first assistant psychological examiner, responsible for direction of group examining, oversight of psychological building, scoring of examination papers and handling of records; (4) second assistant psychological examiner, responsible for psychological service to development battalions and relations of the psychological staff to such organizations; (5) third assistant psychological examiner, responsible for personnel office relations, uses of intelligence ratings, and special assignments.

To facilitate improvement of psychological service and increase its practical values through the interchange of ideas and varied sorts of information, a monthly bulletin was prepared by the staff of the division of psychology and issued to all examining stations between June and September, 1918. This bulletin proved extremely valuable. Its content was varied and it served at once as a medium of news and of information relating to the conduct of the service. Suggestions from psychological staffs of material that might properly be included in the reports were solicited, although it was necessary to emphasize the military and practical nature of the report. The following quotation is from a letter from the Surgeon General of the Army which accompanied the first number of the report:

In this monthly report the extreme necessity of intensely practical psychological service will constantly be emphasized. The psychological staff which renders maximal service to the Army is incomparably more important than that which conducts special investigations or makes interesting statistical studies for more or less impractical scientific

ends. It is hoped that the report may serve to increase rapidly and over a long period the value of psychological military work and that it may stir every psychologist to more enthusiastic and determined effort to understand the problems of human behavior which are presented by his camp and to do his utmost to assist in their solution.

Service is the only excuse for the presence of professional psychologists in the Army. It is the only thing which will keep them there and enable them to command the respect and admiration of the officers and enlisted men for whom and with whom they work.

To illustrate the materials of this monthly bulletin, that for August, 1918, is reproduced below

OFFICE OF THE SURGEON GENERAL,
DIVISION OF PSYCHOLOGY,
August, 1918.

Third monthly report, issued September 3, 1918.

* * *

I. *Activities of the division of psychology.*

During the last few weeks the activities of the division have considerably increased in variety as well as in evident value to the Army. The organization of development battalions has offered an important additional opportunity for usefulness. The same is true of morale work. From many examining stations the division of psychology is receiving reports which clearly indicate that various lines of psychological service are now organized effectively and are coming to be appreciated in a lively manner by officers of the line as well as by many medical officers. In the majority of examining stations the psychological staffs evidently appreciate the fact that practical service is the only justification for the continuation of psychological examining or any other kind of psychological work in the Army. The chiefs of the psychological service are coming to appreciate the fact that they must in every sense justify their work in the eyes of the commanding general of the camp as well as in the judgment of the medical officers. Indeed, a most important single word of advice from this office is: Demonstrate your usefulness to the officers of your camp and thus command their interest and cooperation.

The division of psychology, for reasons which need not be explained to the professional psychologist, has had to contend with many varied difficulties in the organization and administration of its work. Some of these difficulties are obviously accidental and merely unfortunate. Others are due to weaknesses in our methods or in the ways in which we have attempted to use our results. Recently the War Department approved general orders concerning psychological work which definitely establish it and provide for its conduct in the Army. General Orders, No. 74 has been forwarded in mimeographed form, pending publication by the War Department, to all psychological staffs. Two copies were sent—one for the camp surgeon, to be submitted by him to the commanding officer of the camp, the other for the chief psychological examiner.

Additional copies of these orders can be sent, but unless they are especially requested no additional copies will be sent until the printed form is available.

Almost at the same time that the general orders were approved a request for additional personnel and grades was disapproved. This disapproval was based upon unfortunate misapprehension and misunderstanding concerning the existing needs for psychological service and the status of the personnel which is employed. Unfortunately a letter stating that no additional personnel would be granted for psychological service was sent to each camp. This letter was sent in ignorance of the fact that general orders concerning psychological work had been approved. It is clearly contradictory of the general orders and will doubtless be ignored by camp authorities. It is only fair to the service to state that the assistant chief of staff attempted to recall the letter before it was dispatched but was too late to prevent distribution.

The Division of Psychology has made a new request for additional appointments and ranks, based upon the requirements of the above orders and upon such needs as are evident and such special requests as are available. There is every reason to believe that the staff will fairly and carefully consider this new request and it is believed by this division that favorable action will be taken.

The above statements are made to assure members of the psychological service, whether commissioned or enlisted, that psychological work in a variety of forms is to be continued in the Army and in all probability extended; that the opportunities for promotion according to merit are likely to be as good in this service as in any other; that every thoroughly trained and otherwise competent psychologist is urgently needed and should by all means stick to the service instead of requesting transfer. Patience is required, sacrifice also, but every man should remember that the injustices which he is suffering are suffered by thousands of men who are equally competent and meritorious.

The chief of the Division of Psychology believes that never in the history of the service have conditions been so encouraging as at present. Although fully realizing the danger of prophecy, he feels impelled to say that there are numerous indications that the tide has turned and that military opinion is rapidly becoming favorable to various lines of psychological work. It is clearly our duty to work determinedly, and with constantly increasing appreciation of military needs, for the improvement of military efficiency.

II. *Methods and results.*

Since the last monthly report instructions have been issued for the modification of examination beta by the omission of test 8 and elimination of weighting, and for the use of abbreviated forms of the three methods of individual examination. It is believed that the simplification of methods thus effected and the resulting economy of time should greatly enhance the value of the psychological service by making possible a larger amount of attention to the new problems constantly arising.

Data on intelligence score distributions in certain army occupations have been received from 15 camps. It is hoped that a digest of this material can be completed in time for the summary to go to the psychological staffs before the next monthly report is issued.

The suggestion in the last monthly report regarding the desirability of gathering data which would throw light on the correlation between intelligence grade and value to the service is beginning to bring results. Attention is invited to the report from Camp Kearny, which is summarized elsewhere in this report. Data along this and similar lines should be collected in large amount in order to lay a solid foundation for the future development of the psychological service.

A number of letters from commanding officers have lately been received expressing appreciation of the aid rendered by the psychological staffs. The following excerpt from a letter written by a camp commander to the chief psychological examiner is typical:

The psychological work done and being done by (naming chief examiner) in this camp has been consistently good and has proved of much practical value. At first, due to the innate conservatism of line and even of medical officers, his task was a rather uphill one; but now, largely due to his own energy and tact, and to the thoroughness and honesty of his work, practically all officers have been convinced of its practical value and unique assistance in rating, sorting and disposing of the divers kinds of men as well as officers who pass through such a camp * * * *I consider such an expert and his specialty among the most useful aids lately given the Army toward the scientific and non-wasteful utilization of man power.*

The following statement made by Secretary Baker in an address before the School for Personnel Adjutants at Camp Meigs will also be of interest:

The rating scale (for officers) and the tests for mental alertness (psychological tests) are the application of a perfectly rational method to the great problem of putting a man in the position where he can be of the most service to the country and to the common cause.

Such statements are very gratifying and should encourage us to bend every effort toward increasing the practical value of the psychological work and toward enlarging its applications.

In order to indicate the types of problem arising in the various camps and the ways in which these problems are being met, a considerable part of this report has been devoted to summary notes from letters of chief psychological examiners.

III. *Inspection of psychological service.*

Systematic inspection of the work of psychological staffs was initiated on August 29 when Maj. Yoakum and Capt. Foster started on itineraries that include all stations where examining is in progress. In addition to inspection of present work, investigations will also be made regarding the desirability of organizing psychological service at certain new stations. It is planned to have inspections completed at as many camps as possible within the next six weeks.

The visit of the inspector should in numerous ways benefit the service. Inspectors will report concerning the satisfactoriness of buildings, equipment, and personnel. Methods of examining, filing, and reporting grades will be investigated. Inquiry will also be made concerning the use made of grades by personnel, medical, line, and staff officers. The usefulness of psychologists in dealing with the problems centering about the development battalions and other special military organizations will also be investigated.

This new provision in military psychology should aid in coordinating the work of various psychological staffs. Examiners are expected to cooperate with the inspector in every way by furnishing promptly and fully any information or assistance required.

IV. *Examining for the month of July, 1918.*

1. Number of stations in which psychological examinations are being made: National Army camps, 16; National Guard camps, 11; other stations, 4. Number of camps reporting, 28.

2. Number of men examined:

	White.	Colored.	Total.	Total to date.
Enlisted.....	254,497	37,426	291,833	847,419
Officers.....	3,139	.....	3,139	22,967
			294,972	870,386

3. Number of men given individual examination, 12,628; total to date, 27,766.

4. Number of examinations: alpha only, 184,084; beta only, 84,386; both alpha and beta, 19,724; individuals—P. S., 2,145; S. B., 5,658; Pf., 5,102; total, 12,905.

5. Number of E. grades: In alpha, 21,340; in beta, 21,289; in beta following, 2,094; in individual—P. S., 571; S. B., 2,307; Pf., 2,070; total, 4,927.

6. Number of cases reported for discharge, 1,193; service organizations, 2,245; development battalion, 2,425; regular training, 7,187; special service or training, 300.

7. Mental age, 6 years or below, 851; 7 years, 1,481; 8 years, 2,882; 9 years, 2,661; 10 years, 1,583; 11 years, 896; 12 years, 620; 13 years or above, 426.

Orders have been requested for the transfer of examiners from various stations to Camp Humphreys, Va., for the organization of a new staff in response to recent demands for examining at that station. The orders provide for the transfer of Capt. Joseph W. Hayes from Camp Upton; First Lieut. Harold A. Richmond, formerly at Camp Dix, from Camp Greenleaf; and First Lieut. Garry C. Myers from Camp Gordon. In addition 10 enlisted men are to be transferred from Camp Greenleaf to complete the staff organization at Camp Humphreys. Regular psychological service should become well established at this station early in September.

V. *Morale work.*

Morale work has gone forward with increasing success in Camp Greenleaf. It has been extended from the detention section to other sections of the camp, and it is the intention of the commanding officer to make it camp wide. Copies of Maj. Yerkes's report on the Camp Greenleaf work have been requested by numerous officers in Washington as well as in the camps. Everything indicates that it is highly important for the chief psychological examiner in each camp to bring this matter to the attention of the chief of staff or commanding officer in his camp, and in case of interest to do everything possible to further the organization of morale work and to assist with its conduct. The division of psychology is not officially responsible for morale work, and there is no thought of attempting to transform psychologists into morale officers, but just as in the case of Capt. Bassett, who was recently requested by his commanding general to take command of the development battalion of Camp Logan as a major of Infantry, so the division of psychology would feel compelled in case a psychologist could clearly render greater service in that capacity, to approve the transfer necessary for appointment as morale officer. Our sole interest is in the advancement of the military service. The development of our own special and professional interest should constantly be subordinated to military efficiency. The situation must be viewed in the large.

VI. *The School of Military Psychology.*

Formal instruction in military psychology at Camp Greenleaf was temporarily suspended on August 1. All psychological officers and nearly all enlisted psychologists had completed their courses of training on that date. It is expected that about 50 enlisted men required as psychological aids in reconstruction work will shortly be sent to the school when formal training will be resumed.

For the present, informal instruction, consisting chiefly of actual examining, has been substituted. Some 20,000 soldiers of the detention camp and other medical units have now been examined. Arrangements are completed for the examination of new recruits as they arrive at camp.

Lieut. Anderson has been appointed instructor in psychology and Chief Examiner, Lieut. Frost is extending the scope and improving the character of morale work. Qualified substitutes have been provided for all except 12 of the enlisted psychologists who were on duty as morale soldiers. Lieut. Mertz has been relieved from duty with psychological company No. 1, and assigned to the Camp Greenleaf infirmary to assist in the mental examination of incoming recruits.

VII. *Development battalions.*

The formation of development battalions has given rise to some of the most important problems which have confronted the psychological service. The following notes from letters of chief psychological examiners show the great need for practical help in the classification, training, and placement of men in such organizations:

Camp Sherman, July 22, 1918: * * * I have suggested to our educational director that he classify the men to be developed into three groups according to the intelligence as shown by our records. I also suggested to him that he select his teaching staff with reference to our grading. He has accepted both suggestions and incorporated them in a letter to the proper authorities. The psychological examiner in this camp will undertake to cooperate with the educational director as to the best method of instructing the men in the development battalion. He will also cooperate with the director in reporting progress which these men make.

Camp Cody, July 20, 1918: Psychological ratings have been made of all men in the development battalion. About 150 were discharged on mental grounds, and the men retained were classified according to mental ability.

Camp Sevier, July 18, 1918: At request from division surgeon examinations were given to 75 men who had been recommended by their company officers to summary court officer for transfer to development battalion on the ground of mental deficiency or inaptitude. The psychological board concurred in the recommendation of company officers in 44 per cent of the cases. The ruling has been made in this camp that in the future the summary court officer must have the recommendation of the psychological board before ordering transfers for mental deficiency or inaptitude.

Camp Sevier, July 15, 1918: The division surgeon here thinks General Orders, No. 45 should be rewritten to include formal recognition of the necessity of obtaining the recommendation of psychological board before transfers for inaptitude or mental deficiency. Previous to ruling to this effect at Camp Sevier there was great lack of uniformity among commanding officers in recommending transfers.

Camp Sevier, July 25, 1918: Preparatory to sending the Eighty-first Division abroad, company commanders were asked to recommend the unfit for the development battalion. Over 300 men were recommended, a number which the camp surgeon believed to be unnecessarily large. As a result of the difference of opinion, 359 men were marched in a body to the psychological examining board for individual psychological examination. Within two days abbreviated

examinations had been made of these men with the result that of the 359 recommended for development battalion, 162 (45 per cent) were recommended by the psychologists for development battalions, and 197 (55 per cent) were recommended for regular service. Of those above the mental age of 9, all but about 15 per cent were considered fit for regular service; of those between 8 and 9, about 60 per cent; of those between 7 and 8, about 10 per cent; of those below 7, none.

Camp Travis, July 25, 1918: The commanding officer of development battalion has agreed to cooperate by allowing the psychological board to select low grade men (9 to 11 mentally) in development battalion, and try out methods of training. The commanding officer will furnish noncommissioned officers for the purpose, and the psychological examining board will furnish a plan and a supervisor.

Camp Taylor, August 13, 1918: Of the individual examinations made during the past week a large percentage of the cases were referred to us by various organizations in camp. All mental cases for discharge are referred by the disability board for mental rating. We are assisting in every way with proper classification of mental cases in the development battalion. Company commanders are referring to us those men who appear hopeless as far as drill is concerned. Organizations preparing for immediate service overseas refer many cases to us.

Camp Lewis, August 7, 1918: The commander of the development battalion has felt the need of a psychologist attached directly to the development battalion to assist in the problems arising in the instruction and training of the men in his charge. As a temporary arrangement, one of our trained enlisted men is being sent over daily to assist in whatever way he can. * * * We are conducting experiments to determine the rate of learning of men in the development battalion, with a view to recommending those who are very slow to learn, to labor units.

Psychological examinations have been made of the development battalions at Camps Wadsworth, Meade, and a number of other places. The results show, as would be expected, an extremely large proportion of low letter grades.

Camp Meade has been designated as a station for special study of the problems of the development battalion. At the request of Lieut. Col. Lentz, of the general staff, for the assignment of a psychologist to this station, Lieut. Paterson has been transferred from Camp Wadsworth to study psychological problems and to observe the kinds of service psychology is prepared to render. Capt. Bassett, of Camp Logan, and Lieut. Houser, of Camp Kearny, have been sent by their commanding officers for observation of development battalion work at Camp Meade.

VIII. *Cooperation with neuro-psychiatric officers.*

Among the varieties of psychological service enumerated in an earlier monthly report, satisfactory cooperation with neuro-psychiatric officers was emphasized. The following notes, selected to suggest possibilities, indicate what has been and is being done in this important field at various stations:

Camp Upton, July 1, 1918: One individual examiner has been placed permanently on the special medical board, also one in the base hospital. The latter works constantly with the psychiatrist; the former helps weed out cases for further examination.

Camp Custer, August 3, 1918: At the suggestion of the neuro-psychiatric board, four men have been detailed to work with the special psychiatric board which handles referred cases. All recommendations are accepted without question. Of 10,542 drafted men, 175 were referred for psychological examination (1.7 per cent); 23 of these were rejected.

Camp Custer, July 27, 1918: Four individual examiners have been working with the psychiatrists.

Camp Hancock, July 27, 1918: One member of the staff and two assistants have been detailed to work with the psychiatrists.

Camp Grant, July 2, 1918: Effective cooperation has been established with the psychiatrists. Many found defective are sent home without having completed their enlistment papers, thus effecting a great saving.

Camp Wadsworth, July 13, 1918: It has been arranged that in the future, while troops are being received, a staff of psychological examiners will work with the psychiatrists during the medical examination.

IX. *Significance of intelligence scores.*

Camp Kearny, August 14, 1918: Under authorization of the chief of staff of the Fortieth Division, the chief psychological examiner secured the cooperation of the commanding officers of 11 different organizations in an experiment to determine the value of psychological ratings in picking men who are superior or inferior in military value. In each organization the commanding officers designated from 15 to 30 whom they had found to be especially valuable, about an equal number who were so inferior they were barely able to perform their duties, and about an equal number who were deemed of average value. The officers had been with their men for from six months to a year and knew them thoroughly. After the men were given psychological examination the median alpha scores were found to be as follows for the superior, average, and inferior groups of the different organizations:

	Median superior.	Median average.	Median inferior.
One hundred and fifteenth Military Police	97.5	81	47.5
One hundred and Forty-fifth Machine Gun Battalion	110	80	48.5
One hundred and fifteenth Supply Train	103.5	76	47
One hundred and Fifteenth Trench Mortar Battery	101	67	46
One hundred and Forty-fifth Field Artillery	120	89	56
One hundred and Fifteenth Ambulance Train	95.5	82	68
One hundred and Fifteenth Signal Battalion	115	126.5	105
One hundred and Fifty-sixth Infantry	93	63	43
One hundred and Fifteenth Engineers	112	98	56
One hundred and Fifty-seventh and One hundred and fifty-ninth Ambulance Companies	157	101	70.5
All arms	107	81	58

The above figures are deemed significant. It will be noted that the median score for the superior group is in most cases almost twice as high as the median for the inferior group. The Signal Battalion is the exception to the rule, but here the entire battalion is so highly selected that large differences could not be expected.

Camp Lee, July 16, 1918: In the fourth Engineer Reserve Officers' Training Camp, 80 men were recommended for commissions and 60 for elimination. The percentage of elimination in the various letter groups were as follows: A, 69 cases, 34.8 per cent eliminated; B, 49 cases, 38.8 per cent eliminated; C+, 17 cases, 76.5 per cent eliminated; C, 5 cases, 80 per cent eliminated.

Records of final eliminations from the Fourth Officers' Training Camp at Camp Cody show the following percentage of elimination for those receiving various letter grades: A, 2.7 per cent; B, 14.8 per cent; C+, 18.3 per cent; C, 17 per cent; C−, 55 per cent; D, 100 per cent.

Camp Lewis, July 21, 1918: Psychological examination was given to candidates before their admission to the Fourth Officers' Training Camp. No candidates below 200 were accepted; 17 per cent of the candidates were rejected on this basis. The committee on selection said it was "fine business." After three weeks' training, 19 men who had made below 230 were marked for failure. As a result of the rigid selection the officers state that they have a remarkably bright group of men to deal with.

X. *Methods of conducting examinations.*

Camp Dix, August 12, 1918: In the morning of the next day after arrival the recruit is given the psychological examination. In the afternoon of the same day he is given the various physical examinations and the psychiatric examination. All recruits who are to be examined in the morning are ordered to report in two groups—one at 7.30 and one at 8.30. After segregation according to literacy, the alpha examination is given in groups up to 500; the beta test in groups as large as 100. As soon as 100 beta men have been selected, they are marched into the beta room, given a book and pencil as they enter, and seated for the examination. When the examination is completed the men are marched into the scoring room, and another group at once enters the beta room for examination. In the scoring room the headings are filled out by the clerks, and the men are then passed out through another door. The clerks in the scoring room now proceed to score the 100 beta books of the men just examined. This is finished by the time the next beta group has been examined. In this way 1,100 may be given the beta examination in one day, and the papers for each group scored within 40 minutes after it is marched out of the room. The scoring of alpha examinations is similarly speeded up, so that every man making E in alpha is held for beta without recall. Those making below D in beta are held until individual examination has been given. Thus 2,000 to 2,400 men are handled daily in this camp without the necessity of any recalls. Lists of low score men found in the forenoon are sent to the psychiatrist for use in the afternoon of the same day. All but a few of the psychological grades are reported to the personnel office within 24 hours, and the remainder within 36 to 48 hours.

It would seem that the above arrangement is as near to the ideal as possible. There is every argument in favor of giving the psychological examination almost immediately after the men have been received in camp. The men are in better physical condition than after inoculation; it insures that the results will be available for use by psychiatrists during the medical examination; and it gives the greatest possible opportunity for use of the grades by the personnel officer.

Camp Meade, August 16, 1918: Capt. LaRue has reported to the office of the Surgeon General an experiment designed to obviate the recall of subjects for a second examination. Two men skilled in individual examining were stationed beside the psychiatrists in the general medical examining line. These two examiners interviewed each recruit as he passed and then handed him a card A, B, or I, indicating that he should enter alpha, beta, or individual examining room. Of 1,617 recruits thus classified, 21 per cent were given A cards, 69 per cent B cards, and 10 per cent I cards. In order to find out whether the right man had been picked for the three different examinations, those who received below D in alpha were recalled for beta, and those who received below D in beta were recalled for individual examination.

It was found that of those who had been given A cards only 3.6 per cent failed to earn a grade as high as D in alpha examination, and none of these, after recall for beta, failed to earn a score of D or higher on the beta examination.

Of those given B cards 33.8 per cent earned a grade below D on the beta examination, but when these beta failures were given individual examination it was found that 97.7 per cent of them were found fit for regular service.

Of those given I cards 85 per cent were recommended for regular service and 15 per cent for Development Battalion.

The loss of special recommendations in the one examination plan is less than one-half of 1 per cent of the total number examined. It is possible that even this loss is over balanced by the failure to secure men who are recalled on the repeated examination plan. A special technique of interviewing would probably render the sorting still more effective.

Camp Greenleaf, August 16, 1918: A short method of scoring alpha papers has been devised to do away with the recalls from alpha to beta. By study of 1,000 alpha papers it was found that tests 2 and 3 gave the highest correlations between number of attempts and total alpha score—viz, 0.82. It was found that if the number of attempts on 2 and 3 equals 13 the total score will be more than 15, if less than 13 the papers are scored until 15 points have been earned and then laid aside for later scoring. The method requires scoring or partial scoring of only about 10 per cent of alpha papers. One hundred papers can be scored by five men in five minutes. The operation of this rule loses only 5 per cent who should be recalled.

Camp Wadsworth, August 23, 1918: The psychological staff in this camp is organized as follows: individual examining staff, 1 lieutenant, 3 sergeants, and 4 privates, group examining staff, 1 sergeant, and 3 privates for alpha

examinations, and 1 sergeant, 1 corporal, and 3 privates for beta examinations; development battalion staff, 1 corporal and 1 private; office staff, 1 sergeant in charge, aided by 16 privates in the scoring section, 3 privates in the stenographic section, 2 privates in the statistical section, 3 privates in the checking section, 1 private in charge of filing and records, 1 private in charge of stockroom, and 1 private in charge of mail. In addition, 4 privates are detailed for service in the personnel section, depot personnel office. The chief psychological examiner (a lieutenant) has a sergeant as adjutant.

XI. *Miscellaneous lines of service.*

Camp Bowie, July 6, 1918: The psychological service in this station has proved to be of great value in the handling of recruits aside from giving regularly prescribed examinations. The psychological examiners assist in the medical examinations, in cooperation with the psychiatrists during rush work, by aiding in the selection of low grade men for reexamination, and the chief examiner frequently assists in selecting men of superior intelligence for emergency work, special detail, etc., within the detention camp, as well as in the selection of men for vacancies in different camp organizations.

Camp Taylor, July 31, 1918: Company commanders now refer to us for examination those men who do not get on well at drill * * * The disability board refers all mental cases to us for mental rating before they act on the cases. Our recommendation usually decides the matter.

Camp Wadsworth, June 22, 1918: The adjutant of the First Pioneer Regiment says that he has been greatly helped by the psychological grades; that he is now able to pick out any type of man he wants. He has called in all privates who scored A, and selected a number of them for responsible positions.

Camp Funston, July 15, 1918: On request of the psychological examiner the camp surgeon ordered the psychological grades placed on all service cards. The chief psychological examiner will meet the company commander of each regiment to explain the ratings. The reports to company commanders are delivered in person so that questions may be answered.

Camp Logan, July 15, 1918: The chief psychological examiner now makes lists of the men examined with score, occupation, education, and wages tabulated opposite the man's name. The officers report that it is the most valuable data they have. * * * As a result of frequent conferences with company officers, many promotions and transfers have been made.

Camp Bowie, August 3, 1918: Arrangements have been made with the judge advocate for referring to the psychologist all cases on which special information is desired.

Camp Bowie, July 20, 1918: Tests will be made of prisoners not already tested. Close cooperation has been effected with the judge advocate. * * * Conference has been held with the camp adjutant on the use of the psychological service in the problems of education, training, and morale. * * * The commanding general desires further help in the development battalion than the routine psychological examinations. The director of the Y. M. C. A. desires the cooperation of the psychological board in connection with his problems. * * * Conference has been held with the prison officer at military police headquarters. In the future all prisoners awaiting trial will be sent for examination, and report will be made on intelligence.

Camp Jackson, August 17, 1918: The psychological board at this camp has been made the final authority on literacy. A new stamp has been made by the personnel officer which shows the psychological grade indicating literacy or illiteracy. The psychological staff has been called upon to mark the psychological grade and literacy or illiteracy on the back of overseas card.

Camp Bowie, August 17, 1918: The psychological staff in this camp has prepared outlines for psychological service in connection with the following problems:

(*a*) Information for the judge advocate on cases referred.

(*b*) Information on general and summary court cases.

(*c*) Information from company officers on men of high psychological rating who make poor soldiers.

(*d*) Information from company officers on men with low psychological ratings who make good soldiers.

(*e*) Information for company officers on drill tests on the psychological problems involved in educating and drilling troops.

XII. *Students' Army training corps.*

The following letter from the Committee on Classification of Personnel in the Army, having unusual significance for psychological staffs, is quoted entire. It emphasizes the importance of securing ratings of all draftees by psychological examining staffs in their respective stations:

ROOM 528, STATE, WAR, AND NAVY BUILDING,
Washington, D. C., August 31, 1918.

Maj. ROBERT M. YERKES,
Surgeon General Dept., Washington, D. C.

MY DEAR MAJOR YERKES: At a joint meeting yesterday of the Committee on Classification of Personnel in the Army and of the Committee of the General Staff for Education and Special Training the method of selecting students for the Students' Army Training Corps was discussed. It was decided by a unanimous vote that the psychological tests now being given by you to recruits should be used as a standard in selecting recruits for the schools. The two committees, therefore, urged that you take all necessary steps to see that all the recruits are given the psychological tests as soon as they enter the depot brigade, or other recruiting points from which students are sent to the Students' Army Training Corps institutions.

Yours truly,

WALTER DILL SCOTT.

Psychological service was more or less completely organized in 35 stations before the signing of the armistice. These stations fall into four groups: (*a*) Those in which examining was originally organized in September or October, 1917, and where the work continued throughout the period of the emergency; (*b*) those which were provided for as soon after the official order for extension of psychological examining as suitable officers could be supplied (this group included the majority of camps which received drafted men in considerable numbers); (*c*) stations which seldom, if ever, received drafted men directly and in which therefore the need of psychological examining was less urgent than in the former group; and (*d*) camps which could not be supplied with psychologists until the fall of 1918 because of shortage of officer personnel (this group included a few camps which were not authorized by the War Department until late in 1918).

It has seemed desirable both for the purpose of giving definite and concise information concerning the principal characteristics of the psychological organization and its service in various camps, and to give due credit to the responsible officer, to devote a few paragraphs to an account of the conditions in each of the 35 stations.

CAMP BEAUREGARD, LA.

In October, 1918, the inspector of psychological examining reported that the camp commander at Camp Beauregard, the chief of staff of the Seventeenth Division (then in process of formation), and the camp surgeon favored immediate establishment of psychological service. The division and the acting camp personnel adjutants urged that the examining be established in time to assist in the classification and assignment of the recruits expected to fill the Seventeenth Division. The camp authorities reported that temporary buildings could be supplied. The inspector urged that personnel be sent as soon after the passing of the highest peak of the influenza as possible.

On November 4 Lieut. Manuel reported from Camp Pike as chief of the psychological service. Subsequently Lieut. Metcalf, from Camp Devens, and Sergt. Larrabee were added to the staff; Lieut. Manuel was assigned to base hospital No. 1, San Antonio, in December. Lieut. Metcalf remained in charge until January.

The psychological staff upon arrival made immediate arrangements for examining the enlisted personnel in camp and for handling the expected draft. The camp surgeon requested that all men grading A in physical examination in the development battalion be examined mentally as basis of selection for transfer from the battalions. Temporary buildings for the staff and for examining space were obtained in infirmaries and Y. M. C. A. buildings. A clerical force of 57 men was organized to handle the draft that was suddenly stopped by the armistice of November 11, 1918. Since no draft arrived this force was reduced to a staff of 6 to 12 men until the practical discontinuance of all work early in December. The principal work during November was the carrying out of special investigations requested by the Washington office. Data were obtained on the relation between ratings by officers and alpha scores with several hundred representative literates, and on the effect of doubling the time in the tests.

Number enlisted men examined, 2,375; officers, 12. Total individual examinations, 25.

CAMP BOWIE, TEX.

Lieut. Wheeler reported as chief of the psychological service at Camp Bowie on April 26, 1918; Sergt. Paynter and Pvt. Coxe, from Camp Greenleaf, in June; and Sergt. Russell and Corpl. Jennings in August.

The staff at this camp was established slowly and never reached an adequate total. Clerical assistance was difficult to obtain because of incomplete camp organization. The number of men on special detail varied from 6 to 40.

One entire mess hall and half of an adjoining one were assigned by the surgeon for this service. In May the half building was used for other purposes, though still open for examinations. Late in June two entire buildings were assigned the psychological service. In October the staff moved to two one-story supply buildings more centrally located.

Men reported for examination in companies of 250, and were first separated into two groups, those who had and those who had not finished fourth grade. Each group was then questioned as to reading and writing ability, and necessary changes made. The lower group was then sent to the beta room, the upper to alpha. Those who had difficulty in filling out the headings of the alpha blank were also sent to beta. Whenever possible, both groups were held while, by short-scoring or other methods, failures were picked out for further examination.

Selection for individual examining was especially studied; in October the individual examiner, during the beta examination, selected low-grade cases, who were sent at once to the individual examining room. The beta group was held during the short-scoring of tests 1 and 6, and failures sent direct to individual examination. Reports of examination were delivered in person to regimental commanders, and conference held.

The Thirty-sixth Division moved out of Camp Bowie early in July. Permanent organizations were examined until later drafts arrived. In September the psychological examination was taking place as soon as the men had been registered and assigned to companies. It preceded the physical examination, which in turn preceded the equipment and personnel interview. Reports were made out and sent to commanding officers within 24 hours. Personnel cards and service records were sent to the psychological building, where ratings were entered by men from the personnel detachment on special duty with the psychological board. For the limited-service draft the intelligence rating was entered on the qualification card at the meeting of the final board and considered before the men were definitely classified; and reports of cases for service organizations or discharge were acted upon by this board. Before the end of September intelligence grades were entered on service records.

Since the officer personnel changed rapidly, the chief examiner found that a large portion of his time was spent in acquainting new officers with the nature of his work and its uses. The development battalion was serving primarily as a source from which special-duty men were drawn—a condition which hindered careful psychological work and full development of the service. In spite of this the personnel services of the chief examiner and his staff were unusually numerous, varied, and satisfactory. The chief examiner became practically an associate member of a medical board to examine court cases suspected of mental defect. In cooperation with the camp judge advocate an outline for "Certificate and report of psychological examination" was prepared for reporting court cases, and by arrangement with military police headquarters, all prisoners were examined while awaiting trial. By June an individual examiner was working directly with the psychiatrist, passing the men on with a verbal recommendation; no blank was used. In July Pvt. Coxe was detailed to work regularly with the psychiatrist. On occasion, too, the staff helped the personnel officer in selecting men for special detail, even making out a series of examination questions to aid in choosing personnel interviewers.

Total number enlisted men examined, 27,339; officers, 125. Total individual examinations, 1,220.

CAMP CODY, N. MEX.

Lieuts. Moore and Wood reported for duty in May, 1918; Sergt. Katz, Corpl. Schmidt, and Pvt. Karn in June; Sergt. Jenkins and Corpl. Weber in September; and Lieut. Ream, from Camp Humphreys, in November. The clerical staff was small; seldom over 20 men on special detail. Facilities for everything but group examining were excellent. The shortage of officers was especially noticeable at this camp on account of the unusual number of important services that could have been rendered.

The building in use by the psychological staff was an infirmary assigned temporarily to this work. There was unusual space for individual examining rooms and scoring rooms. The rooms in which it was necessary to do a certain amount of group examining were small and accommodated groups of 50 men or less. It was necessary, therefore, to use the Liberty Theater and the outdoor stadium during periods of rush examining. These buildings were located about a quarter of a mile from the staff headquarters.

Characteristics of examining at Camp Cody were largely due to the number of Spanish-speaking Mexican recruits. Examination alpha was given to English-speaking men with more than fourth grade schooling. The remainder were given examination beta, with which verbal instructions (in English and in Spanish) were in use after August 1. The performance scale was little used, being replaced by a Spanish translation of the Point Scale. It was never possible to give individual examination to all low-grade cases. In making recommendations a man's company record was used to supplement low group-examination grade.

An unusually complete statement of meaning and use of pyschological ratings was prepared for camp use. The staff made a study of intelligence levels in different branches of the service. The Thirty-fourth Division having been in training nine months, the officers were able to indicate men most valuable to their branch of the service after practically all transfers had been completed. On the basis of this study the draft quotas were distributed to the different arms in accordance with the previously determined intelligence requirements. At the request of the intelligence officer, the psychological board made a study of the mental and emotional characteristics of the Mexican draft, with suitable recommendations. Psychologist and psychiatrist worked together in many individual examinations, and especially in cases for courts-martial, on which ratings were regularly supplied the judge advocate and made a part of the record. An officer of the psychological board served for a time as assistant judge advocate on a general court-martial which tried conscientious objectors.

The statistical work of the staff, besides the study of arms of the service, dealt mainly with results of examining, including relation of intelligence to schooling. Comparisons were well expressed in graphs.

Number enlisted men examined, 42,533; officers, 949. Total individual examinations, 517.

CAMP CUSTER, MICH.

Lieut. Toll reported as chief examiner in April, 1918. Lieut. Jones reported as assistant examiner at the same time. Sergts. Taub and Dimmick reported from Camp Greenleaf in May; Corpls. Clarke and Johnson, Pvt. First Class Lefton, and Pvt. Kellogg in June; Corpls. Hoche and Jackson in August. The permanent clerical detail assigned by camp order averaged 14 men. The temporary detail varied from 6 to 20 additional clerical assistants, according to the size of the draft and speed required in the examining and reporting. The regular staff was too small for the size and importance of this camp.

The building finally assigned to psychological staff for office quarters was a one-story building, 20 by 60 feet, previously used as a guardhouse. This space was divided into two large rooms and two very small offices. Routine work and individual examining were carried on in this building. Group examinations were held in the various recreation buildings and in certain school buildings, such as the building of the division bayonet school. The particular building used was selected according to its location with respect to the organization being examined. The usual arrangement where these larger auditoriums were used was to have one assigned permanently for certain hours, and for all recruits and units being examined to report to that building regardless of location. The office of the psychological staff was located near the receiving barracks and depot brigade headquarters. The staff at this camp was assigned to duty under the depot brigade surgeon. This in effect localized its activities and limited its authority and opportunity for service.

Examination alpha was given to white men who were "able to read and write English pretty well" and to negroes who had gone as far as the fifth grade in school. Men unable to take alpha, or making less than 50 (weighted score), were reported as "illiterate" and were given examination beta. Short scoring of alpha blanks before the group was dismissed was at first the regular procedure. Beta failures were recalled for individual examination.

The psychological examination took place after all others; intelligence ratings were therefore not available at the time of the personnel and other interviews. During the July draft, however, four examiners were detailed to work with the psychiatric board dealing with recruits referred for rejection. Practically all the lowest-grade recruits were rejected by this procedure.

The psychological staff at Camp Custer constantly informed officers concerning the intellectual strength of their commands by means of comparative graphs, but was even more conspicuous by the quantity and quality of its statistical work on methods. Its reports ranged from details of technique in giving and scoring tests to the larger revision of examination plans, from "psychographs" of occupations to effect of typhoid inoculation, and were suggestive and stimulating to the Division of psychology, Washington.

Number enlisted men examined, 54,284; officers, 70. Total individual examinations, 2,004.

CAMP DEVENS, MASS.

About the 1st of October, 1917, Lieut. Foster reported for duty. Lieuts. Anderson, English, and Metcalf reported at approximately the same time. Examining continued throughout the fall of 1917, but in the winter of 1918 the entire staff, with the exception of Lieut. Metcalf, reported for special training at Camp Greenleaf. This officer remained in charge until June, 1918, when Capt. Hunter reported as chief examiner. Lieut. Scott reported in July. The enlisted staff trained at Greenleaf consisted of Sergts. Tomlinson, Hitchcock, Wood, Stone, Stein, and Finkelhor.

The examining of the fall of 1917 has been reported elsewhere (pp. 14 f.) In the summer of 1918, with the increase in the staff, changes in procedure were inaugurated. Camp examining was taken up so that all recruits reporting were examined. Alpha was given to men who professed ability to read and write English. Early in August, orders were issued that the psychological examination should precede the physical. A bulletin was issued by the psychological staff on the range of intelligence for the different occupations needed in the Army. Complete statement of the mental status of the Twelfth Division was prepared for use in balancing mental strength of the different units. A report of special interest was prepared on the geographic distribution of intelligence and illiteracy.

The number of men and officers examined previous to April 27, 1918, was 21,397. Number enlisted men after April 27, 48,978; officers, 1,053. Individual examinations after April 27, 2,886.

CAMP DIX, N. J.

The psychological staff reported at Camp Dix in September, 1917. Lack of examining space prevented the examining of troops in large numbers before the end of November. From the beginning of the work at Camp Dix to its close in December, 1918, the chief examiners were Capt. Hayes, Lieut. Richmond, Capt. Berry, and Capt. DeVoss. As assistant examiners the following were on duty for varying periods: Lieuts. Brigham, Richmond, Manuel, Harlan, Doll, Farber, and Woodruff. The Greenleaf-trained enlisted men and noncommissioned officers were Sergts. Ellis, Bernard, Campbell, Fisher; Corpls. Sweeting, Roloff, Fogelman, Aitken, Veazie; and Pvts. Werner, Kornhauser, Edwards, Denton, Custer, Faulkner, and Goldberg.

The overcrowded condition of the camp prevented the assignment of a satisfactory building for the major portion of the time. At the beginning of the work (p. 15) wards in the base hospital were used. In the winter of 1918 the medical and psychological examining staffs were moved to a temporary wooden structure previously used as a cafeteria by the constructing contractors. This remained the headquarters of the physological staff until the close of examining.

At Camp Dix about 28 per cent of the draft was foreign-born and about 20 per cent negro. To avoid excessively large beta groups, standards for admission to examination alpha were set low—ability to read and write English and completion of third grade for white men and fifth grade for negroes. Men making below 10 (weighted score alpha) were reported as illiterate. Time was saved in the beta room by having the headings of the beta blanks filled out by clerks in the scoring room as the group passed out. Groups were held while low booklets were picked by inspection and scored; E men were immediately sent on to further examination, to the capacity of the staff; the remainder were listed for recall. In June it was found impossible to recall a thousand men listed for individual examination. In July alpha failures among negroes

were not recalled. During later rush periods up to 3,000 men per day were examined, this being the capacity of other camp examining boards. After June the psychological examination preceded all others except sanitary inspection and fumigation, and intelligence ratings were in the hands of psychiatric and personnel officers when the men came before them. Each D or E case was marked on the identification tag, which each recruit wears about his neck, with his intelligence rating in red ink. The psychiatric board received a list of the E cases, as a check. Disposition of cases was reported back to the psychological board.

Late in July Lieut. Doll spent several days with the psychiatric board in an endeavor to increase cooperative work, for professional adjustment here had proved more difficult than at other stations. Constant readjustment of methods of clinical examining, in attempts to discover common standards, finally met with success in October.

Camp Dix, during its enforced vacation in the fall of 1917, produced a great deal of valuable statistical work. The reports of 1918 also show a number of important studies. We may note here statistical analyses of successive draft quotas; a report on instruction in the English classes and the relation of intelligence ratings thereto; a statistical study of the foreign-born men in the July draft; a study on the relation of intelligence to court cases, promotions, and special duty assignments, and a detailed clinical report prepared by the clinical examiner.

Previous to April 27, 1918, the number of men and officers examined was 21,026. From April 27 to the close of examining the number of enlisted men examined was 67,766; of officers, 2. The number of individual examinations given was 3,024.

CAMP DODGE, IOWA.

Lieut. Miller reported as chief examiner and Lieut. Sylvester as assistant examiner in mid-April, 1918. Lieut. Van Houten, Sergts. Oppenheimer and Williams, Corps. Fenn and Hudson, and Pvts. Johnson and Brockbank reported in June, Corpl. King in August. About 37 men constituted the temporary detail.

At Camp Dodge the personnel office and psychological office were in the same barracks building. Psychological service occupied the second floor. Practically all of the work of the staff, including group examining, was handled in the building. A few groups were examined out of doors when the weather permitted. The mustering office and medical examining offices were in the adjoining barracks building.

Camp Dodge received a large negro draft. Examination alpha was given to all men who had had 6 grades of schooling or could read English readily. During the alpha examination, men who gave evidence of illiteracy in tests 2 or 3 or in filling out the headings were sent to beta. Both groups were held, in good weather, while the blanks were scored, and failures promptly given further examination. Beta procedure strictly followed the Examiner's Guide until September, when verbal instructions were developed for the negro groups which made up one-fourth of the draft at Camp Dodge.

The general scheme of examining appears in the following paragraphs from a report of September 11:

> Psychological examination of recruits is given at Camp Dodge before the physical examination and before the filling out of the qualification cards. The intelligence ratings are placed upon the qualification cards before the men are assigned.
>
> The reports of the individual examinations are in the hands of the psychiatrist at the time of the general medical examination. The psychiatrist's orderly indicates with black chalk the mental age on the breasts of all men whose mental age is under 10 years.
>
> On the day that recruits report for the psychological examination they have no other examinations. As a rule the physical examination of the companies occurs 24 hours after the psychological examination. This gives us ample time to score and record the result of the examination. During the present draft we have been 48 hours ahead of the physical examination.

Intelligence ratings were favorably received by line officers, partly because at the outset a camp order directed that all officers who had not had psychological examination should report at once to the chief examiner for such examination. By direction of the chief of staff

the personnel adjutant planned to use psychological scores in making assignments to the nineteenth Division. The commanding officer of the depot brigade used the psychological rating in connection with promotions of officers in his command, both to check the recommendations of his officers and to check the significance of the score itself. He reported an unusual degree of agreement between the two ratings. The records on individual examining at Camp Dodge constitute one of the most useful sets obtained. It was usual to have practically the entire trained portion of the staff giving individual examinations during draft periods.

Number enlisted men examined, 68,019; officers, 1,908. Total individual examinations, 4,632.

CAMP FREMONT, CALIF.

Capt. Roberts reported for duty in October, 1918. No trained assistants were sent to this camp. Capt. Roberts was assigned an infirmary as his permanent headquarters shortly after arriving. His principal work was in connection with the development battalions and courts-martial cases. He was also requested to give ratings on officers. A staff of 14 enlisted men was assigned to assist him in the work. The usefulness of psychological examining developed rapidly but lasted only a short time owing to the close of active recruiting.

The number of men examined during this short period of time was 3,165; of officers, 320. Total individual examinations, 758.

CAMP FUNSTON, KANS.

Lieut. Stech reported as chief examiner in April, 1918, and was transferred to Camp Logan as chief examiner in October, 1918. Capt. Rowe reported as chief examiner in June, 1918. Lieut. Shumway was assistant examiner. Sergts. Augenblick, Bird, Erickson, and Harry, Corpls. Blake and Woellner, and Pvts. Hansen, Neal, Rachofsky, and Riggs, who received training at Greenleaf, constituted the permanent detail. The temporary detail varied, but was approximately 22 additional enlisted men.

The psychological building was permanently assigned. It was located near depot brigade headquarters and the staff was attached to the brigade staff. Much of the examining, however, was done in distant detention camps, necessitating much travel and extra administrative work.

Examination alpha was given to men who could read fairly well and had fourth-grade schooling. Small alpha groups were held during the short-scoring of the blanks; with large groups a recall system was used. During examination beta obviously low-grade men were selected by the orderlies and sent to the individual examiner. Doubtful papers were short-scored. One-fourth of all men examined were negroes, and of these 30 to 60 per cent made E on beta. Only the lowest cases (selected on inspection by the chief examiner) were examined individually with a view to discharge. The remainder were recommended for development and labor battalions. Ratings were entered on service records (camp order, July 9).

A psychologist was assigned to work in the psychiatric office at the receiving station during several drafts, but this was later discontinued under pressure of work.

Considerable work was done in examining men for special assignments. The Medical Officers' Training Camp at Fort Riley was examined from Funston. The chief examiner was a member of the examining board for the development battalion. Through the personnel office 20,000 men were transferred from the depot brigade to permanent organizations on the basis of occupational requirements and intelligence tests. This transfer occupied but a few hours and proved an unusually successful method. Intelligence ratings were entered on the service records.

Camp Funston used the opportunity afforded by its negro draft to contribute a noteworthy report on the distribution of intelligence among negroes from different States, and a detailed comparison of negro with white performance in the tests of the Stanford-Binet scale.

Number enlisted men examined, 75,677; officers, 1. Total individual examinations, 2,497.

CAMP GORDON, GA.

Maj. Waugh reported as chief examiner at this camp in March, 1918. Lieut. Estabrook reported in April and became chief examiner in September; Lieut. Myers reported in May; Lieut. Layton, in June. The men trained at Greenleaf were Sergts. Humphreys and Lecky, Corpl. Headrick, Pvt. first class Hagner, and Pvts. Fitch, Bailor, and Feldman. Approximately 39 enlisted men acted as assistants during rush examining.

An infirmary building was used as office, scoring room and store room for the psychological staff. This building was located in the depot brigade organization.

Among white men alpha and beta groups were separated on the basis of ability to read and understand English newspapers and write letters home. Men receiving D in either alpha or beta were recalled for individual examination. Negroes, however, were all given examination beta only; a list of the D− men was sent to the commanding officer that he might send men not making good as soldiers for individual examination.

The psychological examination followed the physical examination and personnel interview. Reports of results were sent to personnel officer, camp surgeon, and commanding officers in from 24 to 96 hours. In July it was ordered that intelligence ratings should be placed on service records. They were entered also on qualification cards, except in the case of immediate transfers.

In September the depot brigade was transferred to Camp McClellan. Examining lessened, and the psychological staff was correspondingly reduced, six of its members being sent to Camp McClellan.

Emphasis at Camp Gordon was laid on methods of instruction in the training of troops and lectures on educational methods to new officers. For a time, the work of the chief was primarily connected with this educational program. Men who received a rating below C were given extra drills and attempts were made to improve their mental condition by school instruction.

Number of enlisted men examined, 62,859; officers, 789. Total individual examinations, 2,951.

CAMP GRANT, ILL.

Capt. Trabue, as chief examiner, and Lieut. Benson reported for duty in April, 1918. Capt. Deerwester and Lieut. Terry reported in May. Capt. Trabue was transferred to The Adjutant General's department for work on the classification of personnel and Lieut. Sylvester, succeeded him in October. Sergt. Habberstad, Corpls. Johanson, Beck, and Lynd, and Pvts. Elterich, Marvin, and Baird constituted the other members of the staff trained at Camp Greenleaf. During rush examining the temporary detail varied from 50 to 60 additional men. Psychological examining began the latter part of May and during the week ending June 1 the two officers who had reported examined 13,321 men; on a single day of this week they gave alpha and beta examinations to 2,927 men.

Until the middle of September the office space available was not very satisfactory. In addition to being too small it was also of uncertain tenure. About the middle of September the psychological service was assigned for permanent use a large two-story barracks building located near the administrative center of the camp. The organization of office work was unusually systematic.

Men who could read and write rapidly and those who had had at least seventh-grade schooling were given examination alpha. At first alpha and beta failures were recalled, but by September the groups were held while low papers were scored and further examination followed at once.

The psychological examination here preceded the physical from the very start. Moreover, when new recruits were examined, the clinical psychologist and his assistants worked in conjunction with the medical staff. Names of men who failed in beta and individual examination were before the psychiatrist at the time of physical examination; intelligence ratings on all men went to the personnel officer before the personnel interview with such prompt regularity

as to call forth favorable comment from the inspector of personnel work. Ratings were entered on qualification cards on the evening of the day they were made out, and on all service records (camp order, July 21).

Relations with all camp authorities were particularly cordial. Special psychological service was in frequent request and recommendations were very generally accepted by psychiatrist, judge advocate, and other officers.

Number enlisted men examined, 81,341; officers, 1,888. Total individual examinations, 3,496.

CAMP GREENE, N. C.

Lieut. Chamberlain reported as chief examiner in April, 1918; Lieut. Owens reported in September. Sergts. Rosenfield, Moore, Cribbs, and Sides, and Corpl. Terrell were the Greenleaf trained assistants. Group examinations were conducted in Y. M. C. A. buildings near the small building assigned as temporary offices for the psychological staff.

Alpha and beta groups were separated on the basis of ability to read newspapers and write letters home and of fourth grade schooling. Alpha failures were not given beta, but individual examination. Thirty-eight per cent of the recruits were negroes, most of whom had to be given beta and half of whom received D−. With the approval of the inspector of psychological service, this condition was met by substituting a standardized five-minute interview for the individual examination. On this basis negroes were recommended for combat battalions or for labor battalions.

At the receiving station, psychological examination preceded the physical, at which D men were designated by the letter P plainly painted on their bodies; two psychologists on duty with the psychiatrist gave individual examinations at this time and sent the mental ages at once to the psychiatrist. Intelligence ratings were reported promptly to the personnel officer and commanding officers, usually within 24 hours after the examination. Lack of clerical help in the personnel office sometimes prevented entry of ratings on qualification cards; entry was made on service records.

The chief psychological examiner at this station was eventually put in charge of the educational program in the development battalion.

Number enlisted men examined, 27,331; officers, 476. Total individual examinations, 914.

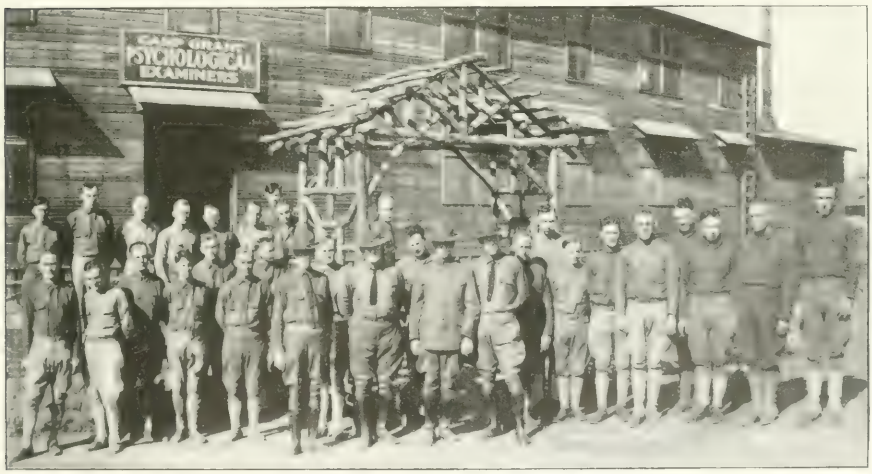
CAMP GREENLEAF, GA.

Examination of recruits was not the main aspect of the psychological service at Camp Greenleaf. The School of Military Psychology, reported in section 2 of this chapter, took first place. The examining staff changed continuously as its members were ordered out to other stations. It was, however, the only station at which was erected a permanent building especially designed for the work.

Those men were given examination alpha who could read newspapers and write letters home in English, had completed the fourth grade, and had been five years in the United States. All others took beta. Short scoring methods were used on both, and failures held for immediate further examination. No recalls were possible. Until November the psychological examination was the last on the recruit's program. The first inoculation for typhoid had usually occurred the day before; the men had to march a mile and a half to the psychological building. A psychologist was, however, in attendance during the physical examination, who selected obviously low-grade cases and gave immediate individual examinations. Rejections were made on these recommendations, while later discharge was hard to secure.

Report of intelligence ratings was made within 24 hours; they were entered on service records and on qualification cards (camp order, July 31). In the spring, organizations at Camp Forrest were examined by the Greenleaf staff. Daily examination was made of officers reporting at the Medical Officers' Training School. The psychologists here made a valuable contribution toward the abbreviation of the Point Scale; they also produced a Yiddish translation of the Point Scale. A rapid alpha short-scoring scheme based on the number of attempts

SUPPLY COMPANY BARRACKS ASSIGNED TO PSYCHOLOGICAL EXAMINING BOARD.



SUPPLY COMPANY BARRACKS ASSIGNED TO PSYCHOLOGICAL BOARD AT CAMP GRANT, SHOWING TYPICAL PSYCHOLOGICAL STAFF.

Of the four officers in front, the captain at the left is the psychiatrist, the three lieutenants (Sylvester, Benson, Terry) are psychologists.

in tests 2 and 3 was developed. Systematic morale work had its inception at Camp Greenleaf and owed much to the psychological staff.

Number enlisted men examined, 50,011; officers, 6,086. Total individual examinations, 2,187.

CAMP HANCOCK, GA.

Lieut. Morgan reported as chief examiner in April, 1918; Lieut. Hood did not report until July, 1918. Assistant examiners were Sergts. Williams, Kenner, Blanchette, and Borden, and Pvts. Holley, Jones, and McCarthy.

Camp examining and official work began here in a room 40 by 20 feet; later a regimental infirmary was assigned for office work and individual examining. The latter building was centrally located.

The Ordnance training groups here were highly selected; the draft was relatively low. To avoid recalls, only white men who could read and write fairly well, and had sixth grade schooling, and negroes who had attended high school were given examination alpha. Short-scoring methods were developed for both alpha and beta; failures from either were recalled for individual examination.

Until September the psychological examination followed the medical, but a psychologist and two assistants, working with the medical board, examined cases suspected by the psychiatrist of mental deficiency and reported back the mental age found. Later, the psychological examination was given first. Ratings were reported within 24 hours, entered on the qualification card and, after September, on the service record.

It was ordered at Camp Hancock that every paper having to do with promotions or demotions must show the intelligence rating on it. The chief examiner was appointed to serve on the board to examine men found unfit for overseas service.

Number enlisted men examined, 44,052; officers, 381. Total individual examinations 2,210.

CAMP HUMPHREYS, VA.

Capt. Hayes reported as chief examiner in September, 1918. Lieuts. Paterson, Richmond, and Myers were assistant examiners and also chief examiners for short periods. Sergts. Doerman, Wickman, Giesel, Ream, Nau; Corpls. Perla, Josey; and Pvts. Corzine, Hines, and Schneider were Greenleaf trained assistant examiners. Well-located and spacious office rooms and quarters were permanently assigned the psychological staff. Line officers were favorably impressed with the value of psychological service. The distinctive feature of the work at Camp Humphreys was the full statistical report of the examination of each organization with distribution of intelligence scores illustrated by graphs. These reports included comparative data from the draft as a whole and enabled camp officials to appreciate differences in mental strength between organizations as well as within their own command. An experimental combination of alpha and beta tests was tried out and reported. Especially did Camp Humphreys afford opportunity, which was well used, for study of intelligence qualifications of various engineering organizations.

Number enlisted men examined, 13,192; officers, 789. Total individual examinations, 436.

CAMP JACKSON, S. C.

Capt. Edwards reported as chief examiner in April, 1918; his assistants were Capt. Ash and Lieut. Roberts, Corpls. Pearson, Whitehead, and Zimmerly. First Sergt. Lancaster, Pvts. White, Wembridge, Tea, Thorpe, Shefveland, and Chambliss of the examining staff, were also Greenleaf trained men. An average of about 40 men worked on special detail with the psychological staff.

The examining station was moved several times in the latter part of its work; the original building was a large two-story barracks building with sufficient space for all of the activities of the psychological service.

Camp Jackson was one of the camps handling the largest number of men; the psychological staff was thus forced to try out various short cuts in the examining program. Segregation for

alpha was on the basis of ability to read and write. (The psychological examining board was made the final authority on literacy in Camp Jackson, and made a literacy report concerning each man examined.) No recalls were made from alpha to beta; failures in each or men who were observed to be doing little or nothing during group examination were, in rush periods, (as in July, when 60 per cent of the negro draft failed on group examination) handled as follows: Twelve men were trained to give seven of the tests of years X and XII of the Stanford-Binet scale, and all who showed a mental age of 10 years were passed; the remainder received regular individual examination. The procedure was carefully worked out and received the approval of the inspector. Even with this abbreviation, several hundred failures were missed in June.

By camp order no examination could be made within 48 hours after inoculation. September 1, psychological examination was placed before inoculation, but was still preceded by the physical examination and personnel interview. During the physical examination, the psychiatrist sent doubtful cases for psychological examination; during psychological examination, men recommended for psychiatric examination were sent directly to that board. Cooperation was good. Lists of the men recommended for labor or development battalion were sent twice a day to psychiatrist, personnel officer, and commanding officers. Ratings were reported in 12 to 24 hours and were entered on qualification card and on a special "overseas slip" attached to service record. No transfer could be made until psychological and literacy ratings had been received.

Aside from routine examining the staff rendered excellent and varied service. The staff conducted examinations of aviators; the chief examiner became a member of the aviators examining board. Special educational examinations were standardized for the Field Artillery Replacement Depot. Capt. Ash rendered valuable service in the development brigade. No illiterate could be transferred from this brigade until he could make D on examination alpha; no transfer was made into the brigade without both medical and psychological examination. The whole educational program was under the direction of the camp psychologist.

After September, when the depot brigade moved to Camp Sevier, there was no labor battalion, but it was ordered that all men recommended for labor should be assigned to such work. All prisoners in Camp Jackson were examined.

The commanding general ordered that no men with grades less than D should be transferred to artillery replacement regiments. Batteries were, in a number of instances, organized by platoons, according to intelligence. The progress of the men was indicated by transfer from the lower platoons to those more advanced in their training. Those failing to learn with sufficient rapidity in the poorest platoons were finally transferred to the supply company or to development battalions.

A most interesting study was the preparation of substitute alpha and beta examinations during a shortage of blanks. The ingenious alpha, requiring only pencil and blank paper, was successfully used during the emergency; beta was less successful.

Number enlisted men examined, 95,594; officers, 3,402. Total individual examinations, 6,257.

CAMP KEARNY, CALIF.

Lieut. Houser reported as chief examiner in April, 1918. Sergt. Rollins reported from Camp Greenleaf in June; Sergt. Doe in August; Pvt. Ruch, from Fort McDowell, in August; and Sergt. Hauck and Corp. Wills, from Camp Greenleaf, in October. Only one officer was ever stationed at this camp.

This was a tent camp, hence no two-story buildings were available for psychological service. Part of the time the psychological board used mess hall, but the major portion of its office work was done in a tent which also served as a storeroom. This tent was well located in the point of view of accessibility but wholly unsuited to office work.

Very few negroes and, except in the June draft, few illiterates and foreigners were sent to Camp Kearny. Alpha and beta groups were separated on the basis of ability to read, write, and speak English, and completion of the fifth grade. The recall system was used with failures.

Intelligence ratings were entered on qualification cards and on service records, and were thoroughly utilized.

Lack of assistance also hindered effective work. Emphasis was placed upon studies to determine the significance of mental examinations in relation to men considered best and poorest in the different companies and organizations and upon examination of special groups in order that additional information should be available on the level of intelligence suitable for different branches of the service. A large chart was prepared at the request of the chief of staff for his office, giving the information obtained from the above studies. Orders were issued that the organization of units should be based upon occupational data and intelligence ratings. The statistical unit of the psychological staff took full charge of the assignment of men from the draft to existing organizations in the camp. From Camp Kearny was received the first extensive report on the comparison of officers' ratings and alpha scores as determined for different branches of the service.

Number enlisted men examined, 18,510; officers, 411. Total individual examinations, 436.

CAMP LEE, VA.

Psychological examining began at Camp Lee in September, 1917. The chief examiners for the entire period of examining were Lieuts. Yoakum, Hunter, and Ferguson. Assistant examiners for the period of examining were Lieuts. Jones, Bates, and Otis. Noncommissioned officers and privates trained at Greenleaf were Sergt. first class Folsom, Sergt. Rawlson, Corpls. Greenberg and Leach, and Pvts. Lincoln, Cowdery, Amdursky, and Myrick.

Experimental examining during the fall and winter has been described in detail elsewhere. In April, 1918, the continual moving of psychological headquarters ended in the assignment of a building near the center of the camp and near camp headquarters for this work.

The proportion of negroes and of native and foreign illiterates was high at Camp Lee. Segregation for alpha was on the basis of ability to read newspapers and write letters home. During the first part of the examination, men obviously failing were sent to join the beta group.

Group but not individual examinations preceded the physical examination, and were reported in from 6 to 24 hours. A list of D men was sent within six hours after the group examination to the clerk at the mustering office. As the men appeared this clerk marked on the body of each D man a letter P; then the psychiatrist, if he considered the man at all doubtful, had him examined by the psychologist in attendance. Later all marked men were examined individually at this point in the process. This plan eliminated recalls, and presented the intelligence rating as a partial basis for immediate rejection rather than later discharge.

Distinctive work at Camp Lee was the abbreviation of Stanford-Binet and Performance Scales and the preparation of a set of reading lessons for the English classes.

Previous to April 27, 1918, 44,338 officers and men were examined. After April 27, the number of enlisted men examined was 82,071; of officers, 370. Number of individual examinations made after April 27 was 3,008.

CAMP LEWIS, WASH.

Lieut. Brueckner was chief examiner at Camp Lewis. He and Lieut. English reported in April, 1918. From Camp Greenleaf, Sergts. Kolstad and Woody and Corpl. Heller reported as assistant examiners. Sergts. Howard and Teachout were reported by voluntary induction to assist in the examining work at Camp Lewis.

The building was a large barracks building situated some distance from the center of the camp but near the mustering office and receiving office. The upper floor was divided into a number of separate rooms for individual examining. Facilities for group and individual examining were therefore unusually satisfactory.

Conditions and procedure at Camp Lewis were unusual in more ways than one. The draft was mainly white, and unusually intelligent and well educated. Nowhere else was the original scheme of examination so closely followed. Men who could read and write were given alpha:

the short-scoring procedure was used to hold D as well as D– men for examination beta. Failures on beta and men seen to be failing during the examination were given individual examination.

Psychological preceded physical examination and muster. The psychiatric board examining recruits referred many cases for individual examination, and all discharge cases not yet mustered were reported to that board for rejection. Intelligence ratings were entered on service records, and qualification cards from the beginning of May, long before this was the practice at other stations. Entry was made immediately after the personnel interview and used in trade tests, in flagging cards, and in making assignments.

There was excellent cooperation with other camp authorities, including personnel office, commanding officers, neuro-psychiatric board (through Sergt. Howard, who was assigned here during drafts), development battalion, judge advocate, and morale agencies. Many unusual lines of service were quickly perceived and well developed. The Fourth Officers' Training Camp used intelligence ratings from the start, admitting only applicants scoring 200 or more (weighted score). An interesting and practical study of the factors involved in steadiness and trigger squeeze in rifle fire was carried through, and formed the basis of improved methods of selection and training. Training bulletins were issued to those doing the individual examining.

Number enlisted men examined, 73,636; officers, 1,883. Total individual examinations, 2,679.

CAMP LOGAN, TEX.

Capt. Basset reported as chief psychological examiner at Camp Logan in April, 1918; Sergt. Cascaden reported in June; Sergt. Turets and Corpls. Loomis and Wechsler in August; and Pvt. Baird, by transfer from Camp Grant, and Sergt. Bradish and Corpl. McMahon in September. Lieut. Stech reported as chief examiner from Camp Funston in October. The number of men on special detail as clerical assistants varied from 2 to 22.

Considerable difficulty was experienced at this camp in obtaining proper housing space and clerical assistance. Mess halls were used as long as these were available and the construction of a special building was frequently urged by the camp surgeon and the commanding general. Recommendation of the necessary building construction was finally obtained late in the summer of 1918.

Alpha and beta groups were separated on the basis of ability to read newspapers and write letters home in English. Recruits were examined after physical examination; ratings were entered on service records.

Very few recruits were ordered to Camp Logan; examinations made were mainly of camp organizations. The chief examiner prepared a tabulated report on all the men in the 57th Infantry by companies. This report gave in alphabetical form the psychological score, the occupation in civil life, wages, and education, and proved to be of special value to the company officers. Unusual value also attached to the detailed individual personnel work carried on.

The development of this valuable type of detailed individual personnel work led, at the request of the camp commander, to the transfer of Capt. Basset to the line as commanding officer of the development battalion, in order that this especially valuable service might be continuously available to that organization.

Number enlisted men examined, 19,310; officers, 674. Total individual examinations, 319.

CAMP MACARTHUR, TEX.

Capt. Harold C. Bingham reported as chief examiner in October, 1918. He completed his work at the end of November. Lieut. Fryer and Sergt. first class Ten Hoor assisted him. An infirmary was assigned as permanent quarters for the psychological staff. It was located near the personnel office and near camp headquarters. Preparations were made for examining the incoming draft, but no draft reported. The principal work of the staff was the examination of certain special units and the collection of data requested by the Washington office.

Number enlisted men examined, 17,010; officers, 60. Total individual examinations, 4.

CAMP MCCLELLAN, ALA.

Maj. Waugh reported as chief examiner in October, 1918; Lieut. Layton reported at the same time as assistant examiner, and Sergt. Lecky, Pvt. first class Hagner and Pvts. Fitch and Feldman as trained assistants. All were transferred from Camp Gordon.

On October 8 the inspector of psychological examining reported that psychological personnel and authority for the construction of a building for psychological use had been requested by the camp commander. Recruits were expected and the removal of the depot brigade from Camp Gordon to Camp McClellan made it advisable to supply psychological service at once. The main work of the staff when it reported was, therefore, to examine existing camp personnel and make preparations for the expected draft. Prisoners in camp and depot stockade were examined.

Number enlisted men examined, 6,566; officers, 21. Total individual examinations, 45.

CAMP MEADE, MD.

Capt. LaRue reported as chief examiner and Lieuts. Malmberg and Pedrick as assistant examiners in April, 1918. Lieut. Wembridge reported in November. Lieut. Paterson was assigned in August as special examiner of the development battalion. Sergts. Rich, Fossler, and Dealey, Corpls. Tyson and Morton, and Pvts. Glenn, Perrin, Cutolo, and Grosnickle were assistant examiners.

The original building assigned the psychological staff was a two-story convalescent ward in the base hospital. Later a large two-story barracks building near the receiving offices of the camp was assigned for permanent use.

Alpha was given to men who professed ability to read and write and who had reached the fifth grade. The psychological examination followed the physical; this facilitated the operation of a "one examination plan" used in the later examining. This consisted in placing two expert interviewers at the exit from the medical examination board, who examined each man briefly and decided whether he should report at once for the alpha examination, the beta, or for an individual examination. By this means they prevented repeated examining.

Reports were made within 12 hours; intelligence ratings were entered on the qualification cards and "illiterate" was checked on cards of all men who were unable to take and pass examination alpha. Recommendations for discharge were few because of the attitude of medical officers.

The development battalions at Camp Meade were of special interest in connection with the school for development battalion officers. Lieut. Paterson, who was ordered here from Camp Wadsworth in response to a request from the General Staff that psychology be represented, developed the possibilities of psychological service in this connection. He made a complete survey and classification of the battalions, demonstrated the usefulness of intelligence ratings in selecting men for the noncommissioned officers' school, and made recommendations concerning education and training.

Number enlisted men examined, 64,045; officers, 1,655. Total individual examinations 4,013.

CAMP PIKE, ARK.

Lieuts. Stone and Manuel reported as chief and assistant examiners in April. Lieut. Manuel was sent to Camp Beauregard in November to organize psychological service there. Lieut. Breitwieser reported in July. Sergts. Swindle, Noble, and Given, and Corpls. Grainger, Schneider, Schoonmaker, Franklin, and Brown, and Pvt. Wade were sent as assistant examiners from Camp Greenleaf.

A supply company barracks was used as office and headquarters for the psychological staff.

Camp Pike received very few recruits of foreign birth, but many illiterate Americans. Ability to read and write letters home was made the basis of segregation for alpha. About half the men reported for psychological before physical examination; thus neither had to wait for the

other. At the receiving station, men suspected of mental deficiency were sent to the psychological board, where they were given beta, and according to their success either a brief interview or an individual examination. Ninety-six per cent of all recommendations were confirmed by the psychiatrist. The performance scale was little used; foreigners were few, and a verbal scale worked better with the negroes. Ratings were reported within 36 hours and were entered on a new card designed to accompany the service record. This card bore also a statement as to literacy, and the disposition recommended. After September the entry was made directly on the service record and on the qualification card.

Cooperation with other agencies was excellent. Examinations were made regularly of central officers' training school applicants, of recruits in the replacement camp to fill the non-commissioned officers' schools, and of prisoners. Cordial working relations existed with psychiatrists, personnel officers, and officers of the development battalion. The first request for the attachment of a psychologist to the division was received from the commanding officer of this camp.

Number enlisted men examined, 74,041; officers, 1,901. Total individual examinations, 5,720.

PORT OF EMBARKATION, NEWPORT NEWS, VA.

Dr. Bridges arrived as civilian examiner in April, 1918. Officers at Camp Stuart were given group examination alpha, but the work consisted mainly of individual examinations in connection with the neuro-psychiatric board. Aero and balloon squadrons were examined at the aeronautical general supply depot and concentration camp at Morrison. Dr. Bridges was recalled to the Office of Surgeon General in May.

Capt. Paterson and Lieut. Mertz reported December 1, to assist the neuro-psychiatric staff in the classification of nervous and mental cases from overseas and the checking of overseas diagnoses. The group method was found not to be particularly applicable to this problem; the value of individual examining was obvious, but the time allotted for classification was so short as to limit the possibility of its thorough use. Capt. Paterson was recalled early in January and Lieut. Mertz at the end of March.

Additional services were the examination of medical detachments of the embarkation and debarkation hospitals and of women in the detention home, Newport News.

Number enlisted men examined, 1,435; officers, 217. Total individual examinations, 106.

CAMP SEVIER, S. C.

Lieut. Elliott reported from Camp Wadsworth in May as chief examiner. Lieuts. Kefauver and Lane reported as assistant examiners. Lieut. Lane was transferred to Camp Wadsworth as chief examiner in July. Sergts. Hawes and Holmes and Corp. Evans and later Sergt. Sprankle and Corp. Wittenburg reported from Camp Greenleaf. Lieut. White was added to the examining force in November.

At different times one or another of the camp infirmary buildings supplied space for offices, scoring rooms, and rooms for individual examinations. Group examinations were given in Y. M. C. A. halls, mess halls, and later in warehouses adapted for this purpose.

Methods at Camp Sevier were affected by the low-grade draft received. Fourth-grade schooling was made the basis of segregation for examination alpha, but it was found necessary to raise this to sixth grade. Alpha and beta groups were held while the papers were scored, thus obviating recall, except over the meal hour. Failures were then given further examination. Eleven per cent—an extraordinarily large proportion—was examined individually. This was made possible by training a number of enlisted men each to give a single test of the Performance or Stanford-Binet Scale. Each man examined passed the rounds and was finally interviewed and rated by the clinical examiner. Psychological examinations followed physical; ratings were entered on service records and qualifications cards. Close cooperation with the psychiatrists and discharge boards resulted in prompt action on the psychologist's recommendation for discharge of low-grade men.

Excellent relations with the development battalion were established at its inception, when psychological board was called on to decide immediately the fitness for overseas duty of 359 low-grade men rejected by their commanders. Rush methods were adopted for the emergency and acceptable recommendations made. Recommendation of the psychological board was thereafter made a prerequisite to transfer to the development battalion for mental deficiency or inaptitude. The staff was too small to undertake educational work in the battalion. The chief examiner, together with one representative each of the camp surgeon and the camp personnel adjutant, constituted a board with authority to act on all cases of misfit arising in the camp.

On November 1 a complete mental survey of the Twentieth Division as constituted at that time had been finished. For every organization the proportion of men of each intelligence grade was tabulated. All cooperative arrangements with the camp personnel officer were completed so that with the arrival of the expected draft on November 11 the assignment of recruits would have been governed by the aim of balancing in mental strength all coordinate organizations. This appeared especially desirable as the draft would have come in about equal proportion from Louisiana and Massachusetts.

Study of negro examining was undertaken at Camp Sevier; comparison of negro performance in each alpha and beta test with that of white men of equal mental age and study of individual scales to discover tests particularly easy or hard for negroes were the main lines of this work.

Number enlisted men examined, 24,130; officers, 9. Total individual examinations, 2,344.

CAMP SHELBY, ALA.

Capt. Rowe was sent to Camp Shelby as chief examiner in May, 1918. Lieuts. Breitwieser and Hood reported as assistant examiners later in the month. These examiners remained on duty until July. In November Capt. Pedrick reported to reorganize psychological examining; Sergt. Simon, Corp. Tyson, and Pvt. Rosenberry reported as assistants.

The number of men examined during the first period of examining was 6,080, and the number of individual examinations made was 64.

CAMP SHERIDAN, ALA.

Capt. Hunter reported for duty as chief examiner in March; Capt. Dallenbach reported in April and later became chief at this camp. Lieut. Clark reported in October. Sergt. Emmerich and Corp. Rickard were the only Greenleaf trained assistants. Other enlisted men were permanently assigned from camp organizations.

No permanent building was assigned to psychological staff at this camp.

Men who could read and write English fairly well were given examination alpha; later the requirement of six years' schooling was added to reduce the 9 per cent who had to be recalled to beta. All negroes were given examination beta; only the poorest received individual examination.

Practically the entire Thirty-seventh Division was examined before it went overseas. Most men coming into camp were already organized and were secured for examination through their commanding officers. The white draft was examined before, and the negro draft after, the physical examination. Group examination results were reported within 24 hours and individual examinations within 5 to 10 days after group examination. Intelligence ratings were entered on service records and qualification cards. Finally no transfer from camp was permitted without such record.

Cooperative relations were established with personnel officers, psychiatrists, commanding officers, development battalion and judge advocate, and the use of psychological ratings was extensive.

All officers were examined, by order of the camp commander. Psychological ratings were found valuable in considering applicants for the fourth officers' training camp. The following rules were established concerning assignment of negro recruits: the highest 5 per cent were

recommended as noncommissioned officers; men with mental age above 8 were assigned to combatant service; men between 7 and 8 years mental age were assigned to labor battalions overseas, and the men between 6 and 7 years mental age were held for domestic service. Men rating below 6 years mental age were recommended for discharge. Psychological work at Camp Sheridan, begun under unfavorable circumstances, gradually became one of the important activities of the camp.

A psychological report form (see p. 291) was filled out for every man individually examined in Camp Sheridan, leaving on record a valuable mass of information. At the close of examining an extensive tabulation of the distribution of ratings of all organizations was left on file.

Number of enlisted men examined, 53,818; officers, 1,347. Total individual examinations, 2,117.

CAMP SHERMAN, OHIO.

Capt. George F. Arps was chief examiner at Camp Sherman. He reported in April, 1918, and was followed in April by Lieut. Wylie and in August by Lieut. Murchison, who eventually became chief examiner. Both Capt. Arps and Lieut. Murchison left the staff on appointment as camp morale officer. Capt. Deerwester reported from Camp Grant in September for a short period. Sergts. Wilson and Cotter, Corpls. Bruder and Day, and Pvts. Coons, Crowder, McCrady, and Rubins were sent from Camp Greenleaf as assistants. Private McCrady was acting first sergeant in charge of group examining. Sergt. Wilson had charge of individual examining.

The building for psychological service here was the regular barracks building situated one block from the personnel office.

Thirty per cent of the men sent to Camp Sherman were negroes. The white draft was of high intelligence, but since the requirements for alpha were set high (whites, completion of fifth grade; negroes, completion of seventh grade), examination beta and the performance scale were extensively used. The psychological was the last examination on the recruit's program. In September intelligence ratings were regularly entered on qualification cards and service records.

It would be impossible to detail the variety of important psychological services which at Camp Sherman were made a routine part of the work. Beside well-established relations with personnel and medical officers, judge advocate, and commanders of regular and development battalion organizations, examinations were regularly made in the officers' training camp, in the camp of conscientious objectors (where the commanding officer developed an interesting use of the ratings), and among the various welfare organizations. Army nurses were rated. The chief health officer of Chillicothe requested examination of women arrested in and about camp. At request of the intelligence section three tests were worked out to measure discrimination of minute movement, localization of light, and deductive reasoning. Lieut. Murchison was largely responsible for an ambitious educational program which was planned and put into effect in the development battalions and training schools. Statistical work was not neglected; a graphical presentation of comparison between organizations accompanied reports, and an abbreviated point scale was prepared.

Total number of enlisted men examined 62,968; officers, 1,440. Number of individual examinations 2,762.

CAMP TAYLOR, KY.

Psychological examining began at Camp Taylor in September, 1917. Lieuts. Trabue, Cummings, and Doll were the first officers to report for duty. Lieut. Norton was in charge of the individual examining during the summer of 1918. Lieut. Bare reported for duty in April, 1918. Lieut. DeVoss was commissioned in February and reported for duty almost immediately after as assistant examiner. Among the enlisted personnel on service at this camp were Sergts. McWharter, Bowie, Jackson, Uhrbrock, and Denslow and Corpls. Donovan and Parker, trained at Camp Greenleaf. Examining in the fall of 1917 is described on pages 16 and 17.

A regular supply-company barracks was finally opened for the headquarters of the psychological staff at Camp Taylor.

Men able to read newspapers and write letters home, who had completed the third grade (negroes, sixth grade), were given examination alpha. All others took beta, but were not reported as "illiterate" unless totally unable to read and write. Failures on alpha and beta were held during short scoring of the blanks or were recalled for further examination, except in rush examination of negroes.

Four psychologists worked with the psychiatrist on the general examining board during physical examinations, examining individually cases suspected of mental defect. Most of these were rejected at this point. Psychological examination followed as soon as possible after the physical. It preceded the personnel interview, but the personnel officer did not have the intelligence rating at this time. Report was made to personnel and commanding officers on the day following examination, and for entry on the qualification card. The disability board referred all cases before it for psychological examination before taking action.

One of the most distinctive features of the work was the large number of individuals referred by other authorities for psychological examination. Examining was done at Camp Knox, and a report made on low-grade cases. The school for chaplains was examined, making an exceptionally high record.

The staff made several statistical reports on examination beta, including one on the short-scoring method they developed.

Previous to April 27, 23,237 officers and men had been examined. After April 27 the total number of examinations given enlisted men was 53,262; officers, 74. Number of individual examinations given after April 27 was 2,319.

CAMP TRAVIS, TEX.

Capt. Pittenger reported for duty in March and Lieut. Stokes in April. Additional assistants trained at Camp Greenleaf were Sergts. Briggs, Goldberger, and Munroe; Corpls. Krutch and Rich, and Pvts. Rees and Gray. In the permanent detail was Sergt. Ullrich, whose services proved invaluable in establishing the work at this camp because of his experience in army procedure.

Psychological service was permanently established here from the first in a full-sized barracks building, which later was remodeled according to plans prepared by the staff.

The basis for separation of alpha and beta groups was ability to read and write. Men who did nothing on tests 1 and 2 in alpha or on tests 1, 2, and 3 in beta were stopped and sent immediately for individual examination. Obviously poor papers were scored before the group was dismissed. In this way the individual examining was completed, except for a few recalls, by the time the papers were scored. To Spanish-speaking men individually examined the Stanford-Binet was given in Spanish. The performance scale was used as a check on doubtful cases.

Psychological examination was not given until 48 hours after inoculation. Ratings were reported, and entered on service records and qualification cards. No transfer could be made without this information; if the rating were E, or incomplete, there could be no transfer except to a labor assignment or development battalion. Men recommended for consideration of discharge were sent by orderly direct to the psychiatrist; 80 per cent of such cases were discharged. Others found unfit for regular military service were sent, through the camp surgeon, to the disability board; men sent from other sources to the disability board were required to present a certificate from the psychological examiner.

Psychological scores were used in the selection of men for regular service, in formation of white labor battalions, and in filling requisitions for special types of men and noncommissioned officers. The transfer of men from the depot brigade to the Eighteenth Division was made in accordance with psychological and occupational needs. The chief examiner assisted in the reclassification of the development battalion. Additional examining was done at Brooks Aviation Field for the 309th Cavalry, Fort Sam Houston, and at other camps near Camp Travis.

Number enlisted men examined, 76,530; officers, 1,025. Total individual examinations, 7,449.

UNITED STATES DISCIPLINARY BARRACKS, FORT LEAVENWORTH, KANS.

In December, 1918, Capt. Norton, as chief examiner, and Lieuts. Folsom and Lincoln were ordered to Fort Leavenworth to make examination of prisoners. Capt. Norton and Lieut. Folsom were relieved in January; Lieut. Lincoln at the end of March.

Alpha examinations of men who had completed the fifth grade were conducted in the barracks auditorium; beta groups were examined in the schoolroom. Additional individual examinations were made at the request of the psychiatric and sociological board and of medical examiners. Ratings were found valuable by the personnel officer and by psychiatric officers, who recommended to the review board the discharge of men below 8 years mentally. All intelligence ratings were considered in connection with modification of sentences. The statistical work in connection with the psychiatric survey of the institution was carried out mainly under the direction of Lieut. Lincoln.

Number of men examined, 3,605. Individual examinations, 287.

CAMP UPTON, N. Y.

Capt. Hayes reported as chief examiner in April, 1918. In August he reported at Camp Humphreys to organize psychological examining. Capt. Boring reported for duty in April, becoming chief examiner in August; Lieut. Adams reported in June. In November Capt. Boring was called to the Office of the Surgeon General, and Capt. Pedrick was sent from Camp Shelby as chief examiner at Camp Upton. Sergt. Davis, Corps. Gill, Muller, and William Cohen, and Pvts. J. Cohen, Wescott, Hoffman, Browdy, Brown, Goolsby, Whitehead, and Walker were assistant examiners trained at Camp Greenleaf. All physical arrangements for examining were exceedingly satisfactory at Camp Upton.

Men who could read newspapers were given examination alpha. Failures in alpha were recalled for beta. In October, a simple dictation and arithmetic test was introduced to reduce reexamination. Negroes making D– on alpha were given individual examination; by a short-scoring method developed for examination beta, D– cases were held for immediate individual examination.

Until September, the physical preceded the psychological examination. A psychologist on the special medical board (which examined the men selected by the general medical board) gave individual examination to cases suspected of mental defect. This arrangement was continued, although after September the psychological examination was placed first; men rated E were tagged "Report to M. and N. Board" (mental and nervous). A psychologist was present with the individual examination papers, and decision concerning rejection was made conjointly.

Ratings were reported to the personnel officer and to company commanders within 24 hours and entered on the qualification cards before the men left camp. (Most of the recruits were assigned to some other camp at the end of two weeks.) Entry of ratings on service records was begun in August in connection with examination of prisoners, and made universal in September (camp order, Sept. 22).

The staff at Camp Upton was carefully organized for efficient routine work. Beside examination of the draft, a psychologist stationed at the base hospital made examination for the psychiatric staff; prisoners were examined regularly; the development battalions were rated on literacy and on an "English-speaking scale" as well as on intelligence.

Statistical work under Capt. Boring was directed especially toward the study of examination methods. A variety of reports on examination beta, reports on the test of English-speaking ability here devised, and on the possibilities of the personal data blanks tried out for Prof. Woodworth, of Columbia University, were of unusual value.

Number of enlisted men examined, 61,008; officers, 551. Total individual examinations, 3,707.

CAMP WHEELER, GA.

Capt. Poffenberger reported as chief examiner in April. On account of his serious illness, Lieut. Marcus acted as chief examiner until the arrival of Capt. Richmond, in October. Sergts. Hoffer, Springstun, Bishop, Fromuth, Corps. West and Peppel, and Pvts. Zoellner and Neifeld were the assistant examiners who had received training in military psychology at Camp Greenleaf.

Office, scoring room, and storerooms were in an old mess-hall building. Accommodations at this camp were probably the poorest to be found.

Examination alpha was given to those who had completed the fifth (later the sixth) grade, and who could read and write English. On the later basis there were 0.5 per cent D– grades on alpha. These were recalled for individual examination. Negroes were not reexamined after beta unless they failed to make a (weighted) score of 20. The abbreviated Point Scale was chiefly used. Twenty per cent of the limited service draft at this camp required individual examination.

The examination program finally worked out was as follows: Psychological examination followed within an hour after inoculation for influenza. The recruit then went before the medical examining board with which there were two or three psychologists. Intelligence rating on group examination was reported on the temporary identification card; D– cases were at this point given individual examination by the psychologists present, and mental age considered with other causes for rejection. At the personnel interview later, the recruit had with him qualification card, service record, and temporary identification card, and the intelligence rating was recorded by a detail from the psychological staff on both qualification card and service record.

It was ordered here that all officers should take psychological examination on arrival at camp. Men in the development battalion were classified on the basis of intelligence ratings. Psychological scores were used in routine fashion as a basis for classification of negroes into those suited for regular duty overseas and those suited for labor battalions overseas. It was the policy of the neuro-psychiatric board in this camp to assign to regular military training all except very low grade cases.

Number enlisted men examined, 32,299; officers, 689. Total individual examinations, 2,301.

RELATIONS OF PSYCHOLOGICAL TO PSYCHIATRIC SERVICE.

From the first the chief of the division of neuro-psychiatry encouraged the development of psychological service and in every feasible way facilitated the work of the staff of the section of psychology. It was understood that during the period of official trial of methods of psychological examining in army cantonments, psychological and psychiatric officers would cooperate as opportunity offered, but no definite instructions were given to the latter by the Medical Department. Psychologists, on the other hand, were urged to assist medical officers so far as possible without sacrificing the immediate demand for thorough trial of the value of psychological methods. It was provided that psychologists should report low grade and "irregular" cases to psychiatric officers and examine for the latter all cases which were referred for mental age or other type of descriptive report.

Following the official inspection of psychological examining and the decision of the War Department to extend this work to the entire Army, the chief of the division of neuro-psychiatry requested that definite instructions concerning the relations of these two kinds of work be formulated and issued to all officers concerned. The result of this request and of conferences between Maj. Bailey and Maj. Yerkes was the formulation, under date of February 2, 1918, of the following instructions "to promote cooperation and increase the efficiency of the psychological and neuro-psychiatric services."

PROVISION FOR COORDINATION OF PSYCHIATRIC AND PSYCHOLOGICAL EXAMINATIONS IN DIVISIONAL TRAINING CAMPS.

It is agreed between the Division of Psychology and the Division of Neuro-psychiatry—

(1) That psychiatric survey of organizations shall be made in conjunction with psychological survey.

(2) That for this purpose psychiatric examiners shall be present at group psychological examinations, to observe the behavior and appearance of soldiers. It is further provided that the work of the psychiatrist shall not interfere with the proper conduct of psychological examination

(3) That rooms numbered 5 and 6 in building for psychology shall be designated for psychiatric examining.

(4) That the name, rank, and organization of individuals receiving the grade E in group psychological examination shall be reported promptly to the division psychiatrist through the division surgeon.

(5) That report of individual psychological examination shall be accepted by psychiatrist as part of the medical examination and shall be included in the case record if subject be recommended for discharge or for special assignment.

PEARCE BAILEY,
Major, M. R. C., Chief of Division of Neuro-psychiatry.
ROBERT M. YERKES,
Major, S. C., N. A., Chief of Division of Psychology.

The failure of the War Department to provide a special building for psychological examining rendered it impossible for officers to carry out these instructions to the letter, but they were nevertheless carried out in spirit in several important camps.

Although all degrees, as well as varieties, of cooperation between these groups of officers appeared in the different camps, the relations were on the whole surprisingly satisfactory and profitable. In at least half of the camps the reference of cases by psychologists to psychiatrists and the reverse were frequent and obviously in the interests of military efficiency. There were only a few stations in which advantage of the presence of psychological examiners was not taken by neuro-psychiatrists and in these instances inconvenient relation of the examining buildings was quite as often responsible for the failure to cooperate as were unsatisfactory personnel relations or lack of appreciation of methods or of the values of results.

Despite all of the precautions taken by the divisions of psychology and of neuro-psychiatry to avoid it, psychological and psychiatric examinations were frequently confused and serious mistakes were made in connection with official action. These mistakes can not fairly be regarded as attempts to injure the one service or the other. Instead, they are the natural result of similarity of terminology and of the assumption that psychological work, because conducted in connection with the medical department, is a species of medical service.

One of the most interesting and important instances of misconception is that which appears in the following official letters:

AUGUST 16, 1918.

From: The Surgeon General U. S. Army.
To: The Adjutant General of the Army.
Subject: Elimination of mentally defective.

1. Attention is invited to paragraph 1, letter A. G. O., August 8, 1918, which appears to indicate an effort to place restrictions on the rejection of men for psychiatric conditions. It would also appear from the classification heading ("psychological") and from the wording of paragraph 1 ("psychiatric"), that there was perhaps a confusion between the neuro-psychiatric and the psychological examinations. These two examinations are in reality widely divergent, the psychiatric examiners aiming to detect actual cases of nervous and mental diseases, or tendency thereto, while the psychological examination is for the purpose of grading intelligence. The psychiatric examination is a part of the examination for acceptance or rejection of registrants, and psychiatric examiners are members of the examining board. Psychological examiners are not members of this board, and their examinations are not considered in deciding on the acceptance or rejection of a registrant.

2. Attention is also invited to attached extract of cablegram no. 1464, dated July 15, 1918, from Gen. Pershing, which calls attention to the necessity for special efforts to eliminate the mentally unfit prior to departure from the United States.

3. Attention is further invited to the attached memorandum from Maj. Frankwood E. Williams, M. R. C., which indicates that in 34 divisions there were 3,035 men who were recommended for discharge by the psychiatric examiners, but who were not discharged. They presumably accompanied their divisions overseas.

4. It is recommended that this matter be brought to the attention of the department commanders and commanding officers of camps, cantonments, divisions, special camps, and recruit depots; and that instructions be issued directing special care to insure the rejection of the mentally unfit at time of the examination of registrants. Any such cases which are subsequently detected should be eliminated from organizations as promptly as possible and in any event before the organization leaves for a port of embarkation.

For the Surgeon General:

D. C. HOWARD,
Colonel, Medical Corps.

In response to the request by Col. Howard that special instructions be issued to department commanders and commanding officers of camps, etc., the Adjutant General issued on September 17, the following letter:

SEPTEMBER 17, 1918.

From: The Adjutant General of the Army.
To: Department and camp commanders, recruit depot, recruit depot posts, and bureau chiefs.
Subject: Elimination of mentally defective.

1. Attention is directed to the importance of eliminating the mentally unfit. This elimination should be made at the time that the registrants are given neuro-psychiatric examinations but any cases which are subsequently detected must be eliminated from organizations promptly. Careful discrimination between psychiatric and psychological examinations must be made; the latter are not considered in deciding on the acceptance or rejection of a registrant or in the discharge of a soldier. Special Regulations No. 65 and Army Regulations, paragraph 1[illegible], govern, and the provisions of the latter are extended to include commanding officers of replacement camps and other camps under the command of general officers.

2. Reports from France indicate that a large number of men suffering from mental disorders have been allowed to go with replacements. The necessary corrective measures must be applied in the camps of this country.

3. You will notify all concerned under your control.

By order of the Secretary of War:

PAUL CHIDDINGS,
Adjutant General.

Inasmuch as these instructions specifically state that psychological examinations are not to be considered in deciding on the acceptance or rejection of a registrant or the discharge of a soldier, it was necessary for the Division of Psychology to request immediately that the misunderstanding of the significance and uses of intelligence ratings be corrected. To this end the following letter was prepared for the signature of the Surgeon General, but Acting Surgeon General Richard, instead of forwarding this communication to The Adjutant General of the Army, referred it to the Chief of the Division of Neuro-psychiatry, who in turn held it for decision concerning the administrative relations of the Divisions of Psychology and of Neuro-psychiatry.

The letter is reproduced in substance because it supplies interesting information concerning the relations of psychological service to army costs.

Subject: Elimination of the Mentally Unfit.

1. Attention is respectfully invited to the accompanying letter of The Adjutant General of the Army concerning the elimination of the mentally defective and its probable relations to military efficiency and costs.

2. In accordance with present War Department orders, mental rating is provided by the Division of Psychology, Medical Department, for every enlisted man as soon as he arrives in camp. This general survey of drafted men makes possible the prompt selection for careful psychological examination of all individuals who are seemingly unfit by reason of mental deficiency for any type of military service. If the instructions of above letter are complied with in all army training camps literally and conscientiously the cost to the Government, because of failure to reject unsuitable men and delay in discharge, or in the proper placement of men of low grade intelligence, will undoubtedly amount to at least $100,000 per month, at the present rate of army growth. This is much more than the total present cost of the entire psychological service.

3. As pertinent evidence indicative of the urgent need for serious consideration by the general staff of the importance of making use of mental ratings provided by the Division of Psychology, the following data are presented

4. Recently in Camp Zachary Taylor the psychological staff examined 221 men referred by the commanding officer of the 814th Pioneer Infantry, a negro organization at the time preparing for immediate overseas duty. These men had been transferred to Camp Taylor from Camps Beauregard and Shelby, in which as it happens psychological examinations have not been made because of the failure of the War Department to authorize adequate personnel for the Division of Psychology.

5. Of the 221 men referred from the regiment, 109 were found to be unfit, by reason of inferior intelligence, for regular military service.

6. These 109 negro soldiers at the time of psychological examination had been in the army from two to three months, costing the Government in all probability at least $[illegible] a day, and nearly all were insured for $10,000. The majority of them, according to indications of mental rating, are of no value to the Army; a few can be used in labor organizations. It is fair to assume that the waste resulting from failure to reject these men when they originally arrived in camp will ultimately amount to at least $100,000, and in all probability very much more than that.

6. A situation similar to that in Camp Taylor developed at Camp Sevier before the entraining of the Eighty-first Division for overseas. Three hundred and fifty-nine men were referred to the psychologists with the urgent request that they select from the number those whose inferior intelligence made them unfit for regular service. The division authorities felt that the selection as made by the different companies represented widely varying standards, and that in many cases more prowess to the military situation had been mistaken by company officers for stupidity. The difficulty of the situation was greatly increased by the fact that more than two-thirds of the strength of the division had been assigned thereto for less than a month. As one summary court officer expressed it to the Chief Psychological Examiner: "We know nothing of these men and are anxious to have your professional judgment on their mental fitness before taking them with us." On the basis of the psychological examination, 162 men were designated as cases whose

inferior intelligence made it undesirable that they accompany the division overseas. As a result of this situation, which necessitated the special calling in of the psychologists, a ruling was made in this camp to the effect that no man can be transferred to the Development Battalion on the ground of mental deficiency, or inaptitude, without the recommendation of the psychological examiners.

7. It is suggested that this whole subject is worthy of the most careful consideration by the War Department, in order that instructions concerning the elimination of the mentally unfit may be modified as seems desirable, and the administration of mental tests so organized and supervised by the War Department as to insure maximal value to the service.

RELATIONS OF PSYCHOLOGICAL TO PERSONNEL WORK.

Inasmuch as the intelligence rating is an important item of personnel information, it was inevitable that cooperative relations between personnel adjutants and examiners ultimately should be established. The first step in this direction was the provision on the personnel qualification card of space for the entry of intelligence ratings. For many months this entry was seldom made because it had not been definitely ordered and still more because personnel adjutants had not been instructed by The Adjutant General of the Army to use intelligence ratings in connection with selection and assignment.

As the values of the results of psychological examining were demonstrated, the interest of personnel adjutants and also of the Committee on Classification of Personnel in the Army in the intelligence rating rapidly increased. In certain camps which happened to have exceptionally able, progressive, and cooperative personnel and psychological officers, arrangements were perfected whereby results of psychological examinations were promptly and regularly made available for use in the personnel office.

During the fall of 1918 the Committee on Classification of Personnel, in conference with the Division of Psychology, agreed to instruct personnel adjutants to have intelligence ratings entered on qualification cards within a few hours after psychological examination had been made, and further to direct the use of this information in specific ways. As a result of this action, relations of psychological to other forms of personnel work in army camps rapidly became more satisfactory and the practical uses of intelligence ratings increased both in variety and amount.

The following letter indicates the effective working relation established between the Classification Division of the General Staff and the Section of Psychology of the Surgeon General's Office.

APRIL 8, 1919.

From: The Adjutant General of the Army.
To: The commanding general, Camp Meade, Md.
Subject: Classification of men received at "The oversea replacement depot."

1. Enlisted men received at "The oversea replacement depot" at your camp for transfer to the American Expeditionary Forces will be given the intelligence test and occupational classification. The occupational classification will include, whenever desirable, a limited trade test. A soldiers' qualification card (Form CCP-1) will be completed for each soldier and accompany his records when sent overseas.

(*a*) As the medical examination of recruits sent to the depot will have been completed and initial records prepared at the places where recruits have been enlisted, the personnel work in connection with the depot will be limited almost entirely to classification. It is contemplated that only a small personnel force will be required, which will be furnished by this office.

By order of the Secretary of War:

ADJUTANT GENERAL.

In compliance with this order, Maj. Clarence S. Yoakum reported on April 16 at Camp Meade to organize psychological examining and to train a competent officer to take charge of this work under the direction of the chief personnel officer.

On the whole, the most satisfactory administrative relations of psychological examining proved to be those which were originally recommended by the Surgeon General of the Army for consideration of the Committee on Classification of Personnel. These involved (1) the appointment of psychological examiners to serve in connection with other personnel officers as members of the personnel staff of each camp or division; (2) the appointment of certain other psychological examiners to serve under the direction of medical officers. The duties of the first group of psychologists may be described as strictly those of the personnel service. Those of the second group may fairly be described as medical in character.

GROUP EXAMINATION *a* IN A HOSPITAL WARD, CAMP LEE, OCTOBER, 1917.

SCORING GROUP EXAMINATION *a*, CAMP LEE, OCTOBER, 1917.

NEGRO RECRUITS IN LINE BEFORE BARRACKS BUILDING, WAITING FOR ALPHA AND BETA GROUP EXAMINATIONS.

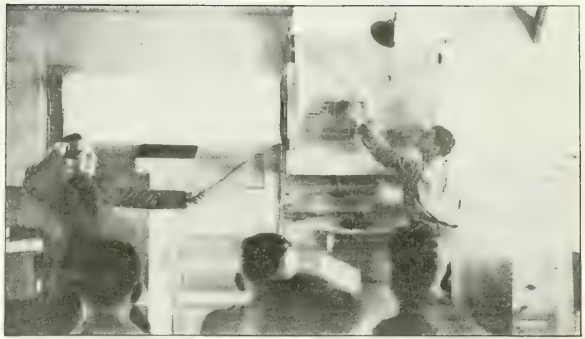
GROUP EXAMINATION ALPHA, BEING TAKEN BY NEGRO RECRUITS.

GROUP EXAMINATION BETA, WITH NEGRO RECRUITS.

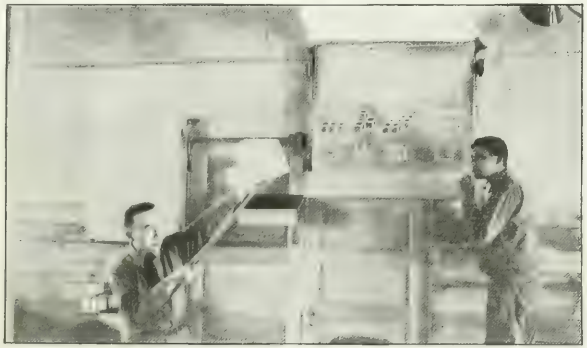
Examiner is at the left, demonstrator at the right, of the beta blackboard. The white geometrical chart at the right of the blackboard was used with test 7 for a time and then abandoned.

SCORING EXAMINATION [illegible] THE SCORERS ARE WORKING AT MESS TABLES ON EXAMINATION [illegible]

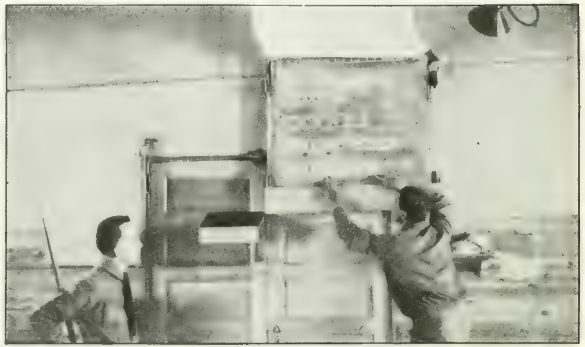
RECRUITS DURING DEMONSTRATION IN EXAMINATION BETA.



DEMONSTRATION OF TEST 1 IN EXAMINATION BETA.



DEMONSTRATION OF TEST 2 IN EXAMINATION BETA.



DEMONSTRATION OF TEST 3 IN EXAMINATION BETA.

INDIVIDUAL EXAMINATION OF ENLISTED MEN WITH STANFORD-BINET SCALE

INDIVIDUAL EXAMINATION OF RECRUIT IN TEST 1 OF THE PERFORMANCE SCALE, THE SHIP TEST.

INDIVIDUAL EXAMINATION OF RECRUIT IN TEST 2 OF THE PERFORMANCE SCALE, THE MANIKIN TEST.

INDIVIDUAL EXAMINATION OF RECRUIT IN TEST 4 OF THE PERFORMANCE SCALE, THE CUBE CONSTRUCTION TEST.

INDIVIDUAL EXAMINATION OF RECRUIT IN TEST 10 OF THE PERFORMANCE SCALE, THE PICTURE COMPLETION TEST.

THE STENQUIST SKILL TEST.

ENLISTED MEN BEING GIVEN THE STENQUIST SKILL TEST.

CHAPTER 4.

GENERAL SUMMARY.

The preceding historical account of psychological examining is outlined by the following chronology, which, in addition to dates, presents the chiefly significant events in the service.

SECTION 1.—*Chronology.*

PRE-OFFICIAL ACTION.

1917.

April 6.—Meeting at Harvard University for discussion of relations of psychology to the war.

April 10 to 14.—Observation of conditions in Canada by president of the American Psychological Association, with special reference to psychological problems of the war and possibilities of service.

April 14.—President of American Psychological Association confers with president of National Research Council in Philadelphia concerning plans for psychological service.

April 19.—Presentation of plans concerning psychological service to National Research Council by president of American Psychological Association at meeting in Washington.

April 21 and 22.—Special meeting of Council of American Psychological Association in Philadelphia for consideration of service in the war and appropriate action.

May 1.—Tentative plan for psychological examining of recruits submitted to the Surgeon General of the Army.

May 28 to June 9.—Special committee on methods for examining recruits organized and in session in Vineland, N. J.

June 10 to 23.—Trial in various institutions of methods prepared for military use by committee.

June 25 to July 7.—Continuation of sessions of committee on methods at Vineland, N. J.

July 15 to August 15.—Unofficial trial of methods of psychological examining made in Army and Navy stations.

July 20.—Substitute plan for psychological examination of recruits submitted to the Surgeon General of the Army through the National Research Council.

August 1.—Informal report made to the Surgeon General of the Army, through the National Research Council, concerning results of trial of methods of examining, together with recommendation of methods for use in the Army.

August 9.—Robert M. Yerkes, president of the American Psychological Association and chairman of the committee on methods, recommended for appointment as major in the Sanitary Corps, to organize and direct psychological examining for the Medical Department of the Army.

August 17.—Appointment accepted by Robert M. Yerkes and work officially begun.

OFFICIAL ACTION.

August 21.—Plan for psychological examining in four National Army cantonments submitted to the Secretary of War in connection with request for authorization of civil appointments for this work.

August 23.—Authority granted for appointment of civilian psychological examiners.

September 1.—Instructions concerning psychological examining prepared for issuance to cantonment commanders by request of The Adjutant General.

September 6.—The Surgeon General notified by The Adjutant General of issuance of instructions.

August 17 to September 17.—Preparation of methods, materials, and personnel for official trial of methods in the Army.

September 17 to December 1.—Period of official trial in four cantonments.

October 1.—Psychological examining in progress in Camps Devens, Dix, Lee, and Taylor.

October 20.—Preliminary reports of results from camps indicate (1) surprisingly high frequency of illiteracy; (2) extreme differences in frequency of illiteracy and in distribution of intelligence for companies of a given regiment; (3) urgent need of a good group method of examining foreign and illiterate subjects.

November 5.—Request by the Surgeon General of the Army that the Committee on Classification of Personnel in the Army provide in its organization for the psychological examination of recruits.

November 16.—Report on official inspection of psychological examining in Camp Lee, Va., submitted to the Surgeon General by Col. Henry A. Shaw, M. C.

December 5.—Chief of the Section of Psychology requests decision of the Surgeon General concerning the future policy of the War Department with regard to the psychological examination of recruits.

December 7.—The Surgeon General recommends to The Adjutant General the continuation of psychological examining and its extension to the entire Army.

December 8.—Request of the Surgeon General that psychological examining be provided for by the Committee on Classification of Personnel disapproved by that committee for The Adjutant General of the Army.

December 8 to 20.—Transmittal to the General Staff of data concerning psychological examining in Army camps, memoranda on plans of future organization, and the opinions of regimental and company commanders concerning the values of intelligence ratings.

December 24.—Approval by the War Department of the recommendation of the Surgeon General that psychological examining be extended to the entire Army, with request for plan of organization.

1918.

January 3.—Plan for the extension of psychological examining submitted by the Surgeon General to The Adjutant General. It was subsequently referred to the training committee of the War College Division of the General Staff.

January 19.—Plan for extension approved. Organization of Division of Psychology in the office of the Surgeon General authorized for the purpose of making psychological examination of all company officers, all candidate officers in officers' training camps, and also of all the newly drafted and enlisted men. The approval explicitly included the provision of the necessary commissioned and enlisted personnel, the establishment of a school of military psychology, and the construction of a special building in each camp or cantonment.

January 20.—School of Military Psychology at Fort Oglethorpe, Ga., authorized for the Surgeon General by the chief of the training division of his office.

January 28.—Plans for special building completed and submitted to the construction department.

February 4.—School of Military Psychology organized at Fort Oglethorpe, Ga.

February 5.—Acting Quartermaster General indorses plans and estimates for special building to the Chief of Staff and requests authority to proceed with construction in accordance with previous instructions from the Secretary of War.

February 11.—On recommendation of equipment committee of the General Staff, the Assistant Secretary of War disapproves construction of special buildings "until such time as necessary funds ($384,000) are made available by Congress."

February 14.—The Surgeon General of the Army requests reconsideration of Acting Quartermaster General's recommendation concerning buildings for psychological examining.

February 19.—Request of the Surgeon General is disapproved.

February 23.—The Surgeon General presents to the Secretary of War the necessity for immediate provision of space in camps for conduct of psychological examinations. The Secretary of War expresses opinion that suitable buildings are probably available in most of the training camps and agrees to address a letter to each commanding general suggesting that a suitable building be assigned for this purpose.

March 5.—Letter relative to building dispatched to commanding generals by direction of the Secretary of War.

March 28.—Deficiency appropriation bill, which originally carried item of $384,000 for psychological buildings, passed by Congress.

March 30.—The Surgeon General, for the Division of Psychology, reports to The Adjutant General concerning replies to letter concerning availability of buildings and recommends definite request that suitable buildings be assigned wherever available and that special building be constructed immediately at School for Military Psychology, Fort Oglethorpe.

April 2.—Recommendation by Division of Psychology for the promotion of 25 officers of the Sanitary Corps, psychological service, approved by the Surgeon General of the Army. Chief of the Division of Psychology so notified.

April 9.—Request of Surgeon General that buildings be assigned, approved by the War Department, and appropriate telegram dispatched to commanding officers of camps.

April 10.—Recommendations for promotions disapproved by the Surgeon General without notification of Division of Psychology.

April 15.—Division of Psychology informed by personnel officer of the Sanitary Corps that no additional recommendations for appointments or promotions in the psychological service may be made until further notice. At the same time it was stated that ranks were not available for psychological appointments because they were being reserved for the gas service. This action was taken in spite of the fact that the War Department had unconditionally approved the appointment of more than twice the number of officers of the Sanitary Corps at the time on duty as psychological examiners.

April 18.—Request prepared by the Chief of the Division of Psychology and forwarded to The Adjutant General by the personnel officer of the Sanitary Corps that the General Staff permit the Division of Psychology to proceed immediately with appointments and promotions in accordance with original authorization of January 19, 1918.

April 19–May 3.—The Surgeon General recommends to The Adjutant General, on the basis of congressional action noted above, construction of special buildings in camps not otherwise provided for.

May 6.—Chief of the Division of Psychology informed by Chief of the Division of Operations of the General Staff that funds were not appropriated by Congress for construction of special buildings.

May 7.—Above information confirmed by officer of the construction department of the office of the Quartermaster General, with the additional statement that item of $384,000 for special buildings was stricken from the bill by direction of a committee of the General Staff.

As a result of this information the office of the Surgeon General proceeded to make the best possible arrangements for examining space through assignment of available buildings.

May 10.—Investigation of psychological examining instituted by the First Assistant Secretary of War, who subsequently assigned Mr. G. H. Dorr to the task of conducting investigation.

May 15.—Investigation of Psychological examining instituted by the General Staff. Col. R. J. Burt ordered to conduct inquiry.

May 16.—Division of Psychology notified that no additional appointments or promotions should be made in the psychological service pending inquiry by the General Staff concerning its values. It was subsequently learned that this inquiry consisted of a request that commanding officers of stations report on the value of psychological examining, the desirability of its continuance, and the possibility of having medical officers do the work.

May–July .—Reports concerning psychological service received by the Office of The Adjutant General from commanding officers of approximately 100 cantonments, camps, posts, and other stations.

The majority of these reports were seriously misleading and wholly unfair to the psychological service. They gradually transformed the favorable attitude toward psychological examining in the Offices of The Adjutant General and the General Staff into one of scepticism, disapproval, and in certain instances, hostility. During this time the Office of the Surgeon General was ignorant of the content of the reports and therefore unable to correct the misinformation.

June 10.—Report of Mr. Dorr on psychological service in relation to neuro-psychiatric service submitted to the First Assistant Secretary of War.

June 18.—Report of Col. Burt concerning psychological examining submitted to the General Staff.

June 25.—Chief of the Division of Psychology confers with officers of the organization committee of the General Staff concerning additional psychological personnel and the relation of reports of commanding officers concerning psychological examining to continuation and extension of psychological service. At this time the Chief of the Division of Psychology discovered the grossly misleading character of the majority of the reports and induced representatives of the organization committee to make direct inquiries concerning psychological examining in order that they might correct the misinformation and confusion resulting from failure of commanding officers to distinguish between psychological and psychiatric work.

July —.—Maj. L. P. Horsfall and Col. J. W. Craig visit Camp Meade to observe psychological examining and inquire concerning its values and needs.

July 8.—Deficiency appropriation bill passed by Congress and sum of $384,000 thus made available for use of Medical Department of the Army for construction of buildings for psychological service.

July —.—General orders concerning psychological examining and its conduct prepared by Col. Burt and submitted for approval of the Chief of Staff. Before issuance the content was so changed that it rendered the psychological examining of recruits optional with commanding officers. Thus, by the change in a single sentence, a division of the General Staff completely altered the instructions originally issued concerning psychological examining and rendered the service of doubtful value.

July 10.—The Surgeon General, for the Division of Psychology, requests authority to proceed with appointments and promotions in the psychological service.

July 25.—The coordination branch of the General Staff reports to the Chief of the Division of Psychology that the sum of $384,000 was carried by the deficiency expenditure bill and that such amount was therefore made available for construction of special buildings for psychological examining. This information was later verified by the construction department of the office of the Quartermaster General.

August 1.—Facts concerning appropriation of funds for special construction brought to the attention of the Chief of the Division of Operations of the General Staff. Thereupon the Chief of the Division of Psychology was advised to request special buildings wherever needed. This was immediately done, but no buildings had been constructed prior to the signing of the armistice.

August 13.—Request of the Surgeon General for approval of additional psychological personnel disapproved by the War Department. It was subsequently learned by the Division of Psychology that this was based upon confusion of psychological with psychiatric work.

August 13.—Letter issued by The Adjutant General to commanding officers stating that no additional psychological personnel would be appointed and strongly suggesting the desire of the War Department to restrict the service.

August 14.—General Orders, No. 74, establishing psychological service, issued by the War Department.

August 31.—Authorization for appointments and promotions in the psychological service again requested by the Surgeon General on the ground of previous misunderstanding of the purposes and values of psychological examining and the demands created by General Orders, No. 74.

October 1.—Request for psychological personnel approved by War Department.

October 1 to November 11.—Recommendations for new appointments and promotions in the Sanitary Corps, Division of Psychology, transmitted by the Division of Psychology.

November.—Arrangements made with Surgeon General Ireland for the completion of psychological examining and the transfer of officers of this service to general hospitals for assistance with the work of physical and mental reconstruction.

December, 1918, to January, 1919.—Plans perfected by the Division of Psychology and approved by the Surgeon General for the analysis of results of psychological examination of one and three-quarter million soldiers and for the preparation of complete official report concerning this service.

1919.

January 23.—Psychological service as organized during the operation of the draft discontinued and the appointment of two civilian psychologists to prepare methods and keep them up to date ordered by the Adjutant General of the Army.

April 1.—Official report on the history and organization of psychological examining in the United States Army completed for publication.

April 8.—Psychological examination of enlisted men received at overseas replacement depot, Camp Meade, ordered, and Surgeon General directed to supply necessary personnel.

April 19.—Section of Psychology ordered by the War Department to prepare suitable method of psychological examination for illiterates and non-English-speaking citizens and aliens.

April 25.—Official report on methods of psychological examining used in the United States Army completed for publication.

May 19.—Action of January 23 rescinded. The Surgeon General, directed by The Adjutant General, to retain in active service during the emergency two psychologists on military status.

July 1.—Official report on statistical results of psychological examining in the United States Army completed for publication.

July 18.—Recruit psychological examination submitted to the War Department for use in examining illiterates and non-English-speaking applicants for enlistment.

SECTION 2.—*Favorable and unfavorable influences.*

The achievements and failures in the service of examining can not be thoroughly understood or appreciated without knowledge of the favorable and unfavorable circumstances or conditions of work. The listing of these circumstances is also in the nature of a summary of this historical record.

Distinctly in favor of the work of mental testing are:

(*a*) The intelligent and active interest of various individuals and committees of the National Research Council.

(*b*) The sympathetic interest of Surgeon General William C. Gorgas and of many members of his staff.

(*c*) The interest also and the progressively favorable attitude of the Secretary of War and his assistants.

(*d*) The unexpectedly favorable results of the initial trial of methods in the Army and the Navy, leading as a matter of course to the recommendation of methods for official trial.

(*e*) Similarly favorable result of official trial in four cantonments.

(*f*) The strongly favorable report of official inspection of the initial work. Col. Henry A. Shaw, the inspector for the medical department, developed a keen personal interest in the

work, and in addition to reporting his observations made numerous and valuable constructive suggestions for the improvement of the service.

(*g*) The fact that approximately 75 per cent of the officers who became familiar with intelligence ratings through the official trial of methods favored the continuation, extension, and improvement of the service within the Army.

(*h*) The fact also that as a result of the first year of this new service the majority of commanding officers of posts, camps, divisions, or other important organizations who had reasonable familiarity with intelligence ratings more or less definitely and strongly favored their use. Indicative of the nature of this service and its values is the fact that with few exceptions individuals who at first objected to psychological examining as a wasteful and impractical novelty, on gaining acquaintance with the work as actually conducted in camps and observing the uses of intelligence ratings, became favorable to the service. This happened frequently and most strikingly in the General Staff of the War Department and in other Washington staffs.

(*i*) Chief among the assets of the service was the constant demonstration of practical value and the recognition of this value by intelligent, open-minded, and progressive officers. In several instances new and important uses of psychological ratings were suggested to psychological staffs by officers of the line.

(*j*) Absolutely essential even for the continuance of the psychological service and still more so for its development were the favorable reports of official investigations. These number three: First, investigation by the War College Division of the General Staff, through request for reports of commanding officers. Despite the fact that these reports were seemingly unfavorable, the investigation itself resulted in unqualified indorsement of psychological work. The second report, based upon investigation initiated by the Chief of Staff, had the important result of leading directly to the preparation of general orders; and the third report, initiated in the Office of the Secretary of War, wholly justified the service on the basis of feasibility, economy, and practicability, and pointed out that psychological ratings would be of extreme significance for military efficiency if the Army could be speedily educated to their proper use.

(*k*) The exceptional personal, intellectual, educational, and professional qualifications of psychological officers did much to carry this new work to success.

(*l*) The establishment of a special school for military psychology and the training of officers of this service in the fundamentals of military behavior, as well as in psychological examining for the Army, at once greatly increased the efficiency of the psychological personnel and impressed experienced Army officers with the wisdom and thoroughness of the organization of the service.

(*m*) The provision of carefully prepared and thoroughly tested methods and equipment, and the attempt to provide also adequate examining space, favorably influenced such officers or other observers as came into intimate contact with the work.

(*n*) The general observation that commanding officers and others in responsible positions usually received the highest of ratings and the fact that the intelligence ratings of arms of the service in general agreed with the consensus of Army opinion were favorable circumstances. Officers of the Engineer Corps ranked very high. This created a favorable impression and unusual interest in psychological examining within that corps and led to numerous special requests for psychological service. It furthermore promoted the service both early and late because the Army recognized the superiority of the engineers.

(*o*) Aiding indirectly but also substantially were the popular recognition of the importance of classifying soldiers mentally and attempting to use intelligence economically and effectively, and the steady stream of requests from commercial concerns, educational institutions, and individuals for the use of army methods of psychological examining or for the adaptation of such methods to special needs.

These are only a few of the assets or favorable circumstances, but among them appear those which played the most important rôle in initiating, preserving, and developing the service of psychological examining.

Contrasted with this list of favorable circumstances is an equally formidable list of disadvantages or handicaps. Again it is impossible to achieve completeness; only those circumstances or events which figure conspicuously can be mentioned:

(*a*) Misunderstanding of psychology and prejudices against anything done in its name. It is said by certain army officers who have good reason to know that the name "psychological examining" did more to retard the development of this work and to render it unreasonably difficult than anything else. It was later suggested by one of the inspectors that the examination be called a test of alertness.

(*b*) Officers who claimed that mental classification was unnecessary because armies had always got along without it previously were not lacking. Some of these individuals objected to the novelty of the new service, others to its scientific aspect or seeming impracticability, and yet others to the risk of interference with military training.

(*c*) In the medical department, aside from the support of a few officers who were intimately acquainted with the methods, there was fairly general and natural opposition or skepticism because it seemed as though psychologists were attempting to do what should be done by medical specialists. This was especially true, with notable exceptions, of the neuro-psychiatrists, and the situation was made considerably worse by the early demonstration that medical officers as a group, as well as the officers in the Dental and Veterinary Corps, ranked relatively low in intelligence. This revelation, quite aside from the fact, tended to prejudice officers of the Medical Department against the psychological service. It made little difference that this fact was first brought to light by a medical inspector and by him made the basis for important special recommendations to the Surgeon General concerning the elimination, careful selection and placement of medical officers.

(*d*) Opposition appeared also in other quarters, for the officers of the line very naturally felt that the War Department, especially through the Medical Department, was attempting to impose many novelties upon the service. These officers seriously objected to the interference with military training and they were frankly and reasonably skeptical of the importance for military efficiency of the many new types of examination, classifications, suggestions and recommendations which were offered them.

(*e*) The early examination of officers and the assignment of intelligence ratings aroused the suspicion that appointments and promotions might be determined in part by the results of psychological examination. This seemed to many officers unfair and it undoubtedly led to much adverse criticism on the part of individuals who had no direct knowledge of the work itself and no reasonable basis for opinion concerning its value to the Army.

(*f*) Officers of the General Staff who were responsible for major decisions concerning the psychological service were at the extreme disadvantage of having to judge from written evidence or the arguments of advocates instead of from intimate first-hand acquaintance with the work of examining as conducted in camps and the practical applications of the information supplied. It is surprising indeed that these officers should have been willing at any time to take the risk of introducing a service at once so novel and so certain to arouse opposition. It is easier to understand why many staff officers conscientiously and persistently opposed the work and after its introduction opposed also expenditures to facilitate it and all attempts to extend it.

(*g*) This opposition in Washington proved most serious to the new service when it prevented the construction of special buildings for psychological examining. Had the buildings been provided as originally requested, planned and authorized, it is reasonable to estimate that the value of psychological examining for increased military efficiency during the last six months of hostilities would have been doubled. The misapprehension of the opposition is also indicated by the fact that the conduct of psychological examining in barracks and other buildings assigned for the purpose actually cost the Army considerably more than the construction of special buildings would have cost.

(*h*) The failure of the War Department to issue special orders and instructions concerning psychological examining for the guidance of commanding officers most seriously affected the

service. Section VII, General Orders, No. 74, August, 1918, would have facilitated and furthered the service most importantly had it been issued six months earlier.

(*i*) The low rank of the officers who were charged with the introduction, organization, and direction of this new service made the work needlessly difficult and relatively very much more so than other new kinds of service. Whereas the chief psychological examiner was invariably a first lieutenant during the first several months of the psychological service, medical officers engaged in tasks of similar responsibility and difficultness usually had the rank of captain, major, or lieutenant colonel. Naturally enough, the rank of the officer in charge markedly influenced the judgment of line officers concerning the importance and value of psychological examining. Indeed, the low rank assigned to competent, experienced and adequately trained psychologists in the Sanitary Corps is one of the most serious injustices to this new service, as well as to the individuals concerned with it. The disapproval, when psychological examining had demonstrated its practical value and the extension of the work to the entire Army had been authorized, of the promotion of psychologists to the grades of captain and major and the resulting necessity for the organization of work in new stations by first lieutenants was another serious blow and handicap to the Division of Psychology.

(*j*) Following this disapproval of promotions, came disapproval of additional appointments for psychological examining, in spite of the fact that the War Department had previously authorized a reasonably adequate number of appointments. As a result of disapproval of promotions and appointments, psychological examining was conducted for months by men whose rank was one or two grades lower than it should have been for the good of the service and in justice to the individuals, and the work was carried forward as best it could be by staffs which usually were not more than half the size which the work demanded. It was the rule during this period, not the exception, that one, two, or three psychological officers of the Sanitary Corps did the work which had been planned for a staff of four officers. These men labored continuously, devotedly, and usually without complaint, under conditions which could scarcely have been more unfavorable, and often with nothing but adverse criticisms and grumbling by way of encouragement.

(*k*) Another disadvantage which must not be overlooked is the fact that psychological appointments were made in the Sanitary Corps, and as a result the psychologist was regarded by medical officers and also by officers of the line as professionally inferior to officers of the Medical Corps, if not to those of all corps. This placed the individual psychologist upon his merits. If he succeeded in commanding the respect, confidence, and admiration of the officers with whom he was associated and for whom his work was being done, it was by reason of his own qualities, his professional proficiency, his tact and insight, and not because of the prestige given him by his corps or his military rank. Psychologists, as well as the service of psychological examining, won on merit and on that alone.

(*l*) It has already been stated that general orders for the use of intelligence ratings were lacking until near the end of the war. This served still further to increase the responsibility and the difficulties of the chief psychological examiner, for in every station commanding officers had to be convinced by demonstration of the various values of the ratings and persuaded to issue on their own responsibility instructions for the use of these ratings. It thus came about that instead of general instructions for the entire Army issued from the War Department, there existed in innumerable stations camp or divisional instructions concerning psychological examining and the use of intelligence ratings. In the end this gave the psychological service a very great advantage in certain camps because commanding officers appreciated the difficult circumstances, but its conspicuous local victories were purchased at a great price.

(*m*) It has been pointed out that the use of the word "psychology" very nearly prevented the development of this service. Added to this unfavorable circumstance was the confusion of psychological with neuro-psychiatric work. This resulted naturally and inevitably because of the similarity and unfamiliarity of the terms psychologist and psychiatrist, psychology and psychiatry, and also because of the fact that psychologists were supposed to be working

under the direction of, or in cooperation with, neuro-psychiatrists. In many quarters it was thought that the psychologist was a medical specialist who was responsible for work that neuro-psychiatrists should do. This serious misconception led to complications which lessened the value of psychological examining and constituted the chief basis for some of the disapprovals which most nearly wrecked the Division of Psychology. Had psychologists been called personnel officers and had their work been designated as testing mental alertness, this unfortunate confusion would have been avoided and along with it many misconceptions which still persist in the Army.

(*n*) Popular misunderstanding concerning materials and methods worked to the disadvantage of the service through political and other channels. To the person unfamiliar with such matters, the tests appeared trivial, absurd or unfair. Many people considered it a bad joke to have psychologists conducting examinations by such means in the Army. Some even suspected that the work was being done for scientific purposes merely and against, rather than for, military efficiency. Often the work was wrongly described as investigation or research, instead of as service. These misunderstandings and misinterpretations of method reached even the offices of the Secretary of War and of the General Staff. Some of them undoubtedly had to do with the initiation of special investigations into the conduct and value of the service.

(*o*) Following upon such misunderstandings and misconceptions as have been mentioned, the official investigations created reasonable doubt concerning the permanency of psychological examining. This doubt extended even to the camps and there served to increase the difficulties and discomforts of psychological staffs. It was reported in certain quarters that psychological examining had been discredited by reports of official investigation, that the work lacked the support of the General Staff and would shortly be abandoned. It is not difficult to imagine how such rumors interfered with the progress of the service and tended to reduce its practical value.

Although this is only a partial list of disadvantages, it would appear like overhigh praise of the success of psychological examining to extend it or to attempt to emphasize more strongly adverse as contrasted with favorable conditions of work. As a matter of fact, the conditions which have been listed as unfavorable may have done much to stimulate the psychological personnel and to develop a fighting spirit which refused to admit even the possibility of failure.

Section 3.—*Summary of examining.*

The achievements of the psychological service between September, 1917, and January, 1919, may at this point be summarized very briefly, since this memoir presents a detailed account of the work with reference especially to organization, methods and practical results.

After preliminary trial in four cantonments psychological examining was extended by the War Department to the entire Army, excepting only field and general officers. To supply the requisite personnel, a school for training in military psychology was established in the Medical Officers' Training Camp, Fort Oglethorpe, Ga. Approximately 100 officers and more than 300 enlisted men received training at this school.

The work of mental examining was organized finally in 35 army training camps. A grand total of 1,726,966 men had been given psychological examination prior to January 31, 1919. Of this number about 42,000 were commissioned officers. More than 83,500 of the enlisted men included in the total had been given individual examination in addition to the group examination for literates, for illiterates, or both.

Between April 28, 1918, and January 31, 1919, 7,800 men (0.5 per cent) were reported with recommendations for discharge by psychological examiners because of mental inferiority. The recommendations for assignment to labor battalions because of low grade intelligence number 10,014 (0.6+ per cent). For assignment to development battalions, in order that they might be more carefully observed and given preliminary training to discover, if possible, ways of using them in the Army, 9,487 men (0.6+ per cent) were recommended.

During this same interval there were reported 4,780 men with mental age below 7 years; 7,875, between 7 and 8 years; 14,814, between 8 and 9 years; 18,878, between 9 and 10 years.

This gives a total of 46,347 men under 10 years' mental age. It is extremely improbable that many of these individuals were worth what it cost the Government to maintain, equip, and train them for military service.

A more detailed statistical summary is supplied by the following tables, which are relevant alike to the present discussion and to later discussion of results of examining.

Previous to April 28, 1918.—Until April 28 itemized weekly reports of the psychological examinations made at each station were not required by the Surgeon General. The data for this period are therefore not as complete as for the period from April 28, 1918, to the end of the work. However, table 3 gives the approximate number of examinations for the early period.

TABLE 3.—*Approximate number of examinations previous to April 28, 1918.*

Month.	Total.	Camp Devens.	Camp Dix.	Camp Lee.	Camp Taylor.	Camp Meade.	Camp Meigs.	Camp Gordon	Officers' Training Camps.	Quartermaster Corps.	Base hospital No. 22.	Conscientious objectors.	Station 26.
September	39			39									
October	24,283	8,311	316	14,456	1,200								
November	36,123	10,945		17,403	7,775								
December	25,501	726	14,000	3,000	7,775								
January	11,443	799	1,074	3,000	487				6,083				
February	14,812	55	656	2,500		1,409	791	1,359	6,083	1,959			
March	15,539	531	4,878	3,940	6,000						190		
April (through 27th)	12,103	30	102				100					796	11,075
Total	139,843	21,397	21,026	44,338	23,237	1,409	891	1,359	12,166	1,959	190	796	11,075

April 28, 1918, to January 31, 1919.—From April 28, 1918, to January 31, 1919, 1,556,011 men and 32,893 officers were examined by the Division of Psychology. Of these, 79,908 were given individual examination (Table 4).

TABLE 4.—*Summary of psychological examining by months—May, 1918, to January, 1919.*

Month.	Number examined.	Individually examined.		Total alpha.	Beta only.	Both alpha and beta.	Total beta.	Point Scale.	Stanford-Binet	Performance Scale.
		Number.	*Percent.*							
May	221,004	2,740	1.24	179,551	27,885	13,710	41,595	739	1,457	693
June	216,348	8,763	4.05	168,276	36,913	19,632	56,545	993	5,243	2,738
July	294,972	12,628	4.28	203,808	84,386	19,724	104,110	2,145	5,658	5,102
August	327,443	21,376	6.53	218,523	105,669	16,590	122,259	5,823	9,485	6,089
September	294,150	18,394	6.25	212,670	80,232	7,919	88,151	5,562	9,078	3,657
October	105,729	10,174	9.62	69,404	30,619	2,537	33,156	2,417	4,712	2,947
November	86,506	4,790	5.54	65,043	18,719	6,986	25,705	916	2,138	1,793
December	42,629	1,032	2.42	32,207	8,981	2,961	11,942	137	713	99
January	123	11	8.94	114		6	6		5	1
Total	1,588,904	79,908	5.03	1,149,596	393,404	90,065	483,469	18,732	38,489	23,119

Of the entire number, 221,550 men and 199 officers (14.2 per cent) were negroes (Table 5).

Of the 1,566,011 men, 25.3 per cent were unable to "read and understand newspapers and write letters home," and were given the beta examination for illiterates. An additional 5.7 per per cent, after failing the alpha examination for literates, also were given the beta examination (Table 5). It is estimated that more than half of this 31 per cent were native-born Americans.

Of the individual examinations, 23.3 per cent were made by means of the Point Scale, 47.9 by the Stanford-Binet, and 28.8 per cent by the Performance Scale (Table 5).

The per cent of D− grades on examination alpha decreased, with fluctuations, from May to December, largely due to the change of grading basis in June, and again in August. The per cent of D− grades on beta depended largely on the proportion of negroes coming into camp, being highest for August when the proportion was greatest. The per cent of D− and E grades on individual examinations was irregularly affected, during the latter part of the examining, by the fact that some of these cases were men referred by their commanding officers for examination (Table 5).

TABLE 5.—*Summary of psychological examining by months—May, 1918, to January, 1919.*

Month.	Per cent of men, officers excluded.			Per cent D- or E grades.						
	Negro.	Beta only.	Beta total.	Alpha.	Beta.	Beta after alpha.	Point Scale.	Stanford-Binet.	Performance Scale.	Total individual examinations.
May	6.4	13.1	19.6	10.3	22.0	5.0	32.6	36.4	30.7	35.9
June	11.2	17.2	26.4	11.7	22.2	4.9	28.8	[1]15.4	31.7	22.4
July	12.8	28.9	35.7	10.6	25.2	10.6	26.6	40.8	40.6	39.0
August	24.1	32.6	37.7	8.5	27.2	10.9	25.1	29.9	38.6	30.5
September	13.4	27.5	30.2	6.2	24.5	7.2	18.2	26.1	27.6	23.7
October	18.6	30.4	32.9	5.6	24.2	6.6	31.9	30.9	25.8	30.6
November	7.6	23.5	32.3	3.0	16.5	3.4	26.2	28.7	38.9	34.7
December	10.6	22.1	29.4	8.0	13.3	5.1	10.9	28.8	18.2	22.9
January	.....	.....	4.9	.....	.....	.....	.....	.....	.....	.....
Total	14.2	25.3	31.0	8.7	24.3	7.4	24.6	28.9	34.5	29.7

[1] Stanford-Binet was given in June to unselected experimental groups totaling over 1,000 men; hence the marked reduction in per cent of E grades.

The number of low mental ages reported was low in May and June, while the individual examining was not thoroughly under way; it was extremely high in October in relation to total because the influenza epidemic prevented group examinations; and high in August on account of the large negro draft (Table 6).

TABLE 6.—*Mental ages and recommendations.*

[Per cent of men, officers excluded.]

Month.	Mental age.				Recommendation.		
	Below 7.	Below 8.	Below 9.	Below 10.	Discharge.	Service organizations.	Development battalions.
May	0.10	0.25	0.51	0.73	0.25	0.52	.....
June	.18	.48	.96	1.42	.42	1.00	.....
July	.29	.80	1.79	2.70	.41	.77	0.83
August	42	1.07	2.44	4.19	.60	.36	1.09
September	.38	.99	2.06	3.64	.49	.55	.67
October	.61	1.62	3.34	6.14	1.21	.94	1.00
November	.30	.78	1.77	3.53	.69	.75	.73
December	.09	.37	.98	1.71	.13	.35	.14
January	.81	.81	.81	1.63	.....	.....	.....
Total	.31	.81	1.77	2.98	.50	.64	.61

Recommendations for discharge were made in less than one-half of one per cent of all men examined. Recommendations for service organizations and development battalions include another 1.25 per cent. In all, 1.75 per cent were considered unfit for regular military service.

Table 8 summarizes the details of individual examining and recommendations, and shows considerable variations from camp to camp. These are explainable by referring (1) to the nature of the draft received (number of illiterates, foreigners, and negroes, mental level of the district represented and the standards of the local draft boards) and to the fact that elimination by other camp examining boards was made at some stations before, and at others after, the psychological examination took place; (2) to differences in interpretation and application of standards by different staffs and individual examiners; (3) to differences in attitude of the medical boards at different stations, toward recommendations of the psychological staff; (4) to differences in number and kind of cases referred by commanders for mental examinations (Table 8).

TABLE 7.—*Summary of psychological examining by camps from May, 1918, to January, 1919.*

Camp.	Number of men examined.	Number of officers examined.	Number of men examined individually.	Per cent of men examined individually.	Camp.	Number of men examined.	Number of officers examined.	Number of men examined individually.	Per cent of men examined individually.
Jackson	95,594	3,402	6,257	6.55	Hancock	44,052	381	2,210	5.02
Lee	82,071	370	3,008	3.66	Cody	42,533	949	517	1.22
Grant	81,341	1,888	3,496	4.30	Wheeler	32,299	689	2,301	7.13
Travis	76,530	1,025	7,449	9.72	Bowie	27,339	125	1,220	4.46
Funston	75,677	1	2,497	3.30	Greene	27,331	476	914	3.34
Pike	74,041	1,901	5,720	7.72	Sevier	24,130	9	2,344	9.71
Lewis	73,636	1,883	2,679	3.64	Logan	19,310	674	319	1.65
Dodge	68,019	1,908	4,632	6.81	Kearny	18,510	411	436	2.36
Dix	67,766	2	3,024	4.46	McArthur	17,010	60	4	.02
Wadsworth	65,490	2,214	4,557	6.96	Humphreys	13,192	789	436	3.31
Meade	64,045	1,655	4,013	6.27	McClellan	6,566	21	45	.69
Sherman	62,968	1,440	2,762	4.39	Shelby	6,080	.....	64	1.05
Gordon	62,859	789	2,951	4.70	Fremont	3,165	320	758	23.95
Upton	61,008	551	3,707	6.08	Beauregard	2,375	12	25	1.05
Custer	54,284	70	2,004	3.69	Stuart	118	207	50	42.37
Sheridan	53,818	1,347	2,117	3.93	Special examinations	603	111	.....	.....
Taylor	53,262	74	2,319	4.35					
Greenleaf	50,011	6,086	2,187	4.37		1,556,011	32,893	79,908	5.14
Devens	48,978	1,053	2,886	5.89					

TABLE 8.—*Analysis of individual examining May, 1918, to January, 1919.*

[Figures are per cents of number of men examined, excluding officers.]

Camp.	Number of men examined.	Negro.	Beta (total).	Per cent individually examined.	Below 7 years.	Below 8 years.	Below 9 years.	Recommended for discharge.	Unfit for regular military service.	Per cent individually examined recommended for discharge.	Per cent individually examined unfit for regular military service.
Beauregard	2,375	0.1	60.5	1.1	.....	0.04	0.17	0.29	0.3	28.0	32.0
Bowie	27,339	10.8	32.9	4.5	.25	.82	1.78	.50	2.2	17.9	48.4
Cody	42,533	.....	17.5	1.2	.07	.32	.60	.14	.5	11.2	42.4
Custer	54,284	9.9	36.3	3.7	.17	.37	.76	.21	.9	5.8	24.5
Devens	48,978	1.7	30.8	5.9	.09	.39	1.15	.64	1.5	10.9	25.6
Dix	67,766	19.8	35.7	4.5	.16	.48	1.74	.16	.7	3.5	15.4
Dodge	68,019	26.1	35.7	6.8	.15	.50	1.43	.27	1.3	4.0	18.7
Fremont	3,165	.....	.....	24.0	.63	3.03	7.77	1.33	16.5	5.5	68.7
Funston	75,677	25.5	32.2	3.3	.65	1.47	2.52	.60	2.6	18.2	79.9
Gordon	62,859	10.9	31.1	4.7	.43	.96	1.75	.92	2.1	19.7	43.9
Grant	81,341	19.3	32.8	4.3	.58	1.24	2.16	.95	2.4	22.1	55.3
Greene	27,331	39.3	45.3	3.3	.08	.40	1.38	.11	.3	3.4	9.9
Greenleaf	50,011	.9	23.8	4.4	.27	.68	1.42	.87	1.9	20.0	44.0
Hancock	44,052	5.2	32.0	5.0	.30	.98	1.97	.77	2.2	15.4	44.1
Humphreys	13,192	.....	28.6	3.3	.18	.75	1.60	.06	1.1	1.8	32.1
Jackson	95,594	18.1	22.6	6.6	.19	.72	1.87	.16	2.8	2.5	42.1
Kearny	18,510	.01	19.3	2.4	.03	.24	.63	.22	1.4	9.2	57.8
Lee	82,071	8.9	30.8	3.7	.36	.93	1.77	1.08	1.4	29.6	38.8
Lewis	73,636	2.2	27.0	3.6	.28	.68	1.31	.42	1.6	11.6	44.9
Logan	19,310	.3	22.7	1.7	.06	.27	.54	.09	.5	5.3	27.6
McArthur	17,010	6.7	31.4	.02	.01	.01	.01	.....	.....	.....	.....
McClellan	6,566	.5	23.7	.7	.06	.20	.32	.49	.6	71.1	80.0
Meade	64,045	21.3	41.6	6.3	.58	1.30	2.47	.09	.9	1.5	14.0
Pike	74,041	16.5	35.9	7.7	.16	.62	1.84	.96	2.3	12.4	29.9
Sevier	24,130	18.7	34.8	9.7	.74	2.01	4.42	.63	4.3	6.5	44.1
Shelby	6,080	.....	16.8	1.1	.07	.10	.21	.26	.5	25.0	43.8
Sheridan	53,818	10.3	26.0	3.9	.42	1.01	1.77	.50	1.3	12.6	33.9
Sherman	62,968	31.1	44.1	4.4	.46	.99	1.89	.73	1.3	16.6	30.2
Stuart	118	.9	.....	42.4	.85	.85	1.69	12.71	22.0	30.0	52.0
Taylor	53,262	16.9	23.2	4.4	.78	1.77	2.35	.36	.6	8.2	14.2
Travis	76,530	22.3	35.3	9.7	.11	.49	2.33	.18	2.9	1.8	30.2
Upton	61,008	15.6	27.8	6.1	.27	.80	1.99	.68	2.1	11.2	34.6
Wadsworth	65,490	6.3	24.0	7.0	.24	.73	1.82	.23	1.3	3.3	18.7
Wheeler	32,299	11.1	35.9	7.1	.19	.42	1.15	.37	3.1	5.3	43.9
Special examinations	603	.....	5.1	.....	.....	.....	.....	.....	.....	.....	.....
Total	1,556,011	14.3	31.1	5.1	.31	.81	1.77	.50	1.8	9.8	34.2

Summary of examining, April 28, 1918, to January 31, 1919.

1. Number of stations in which psychological examinations were made, 34.
2. Number of men examined:

	White.	Colored.	Total.	Total to date.[1]
Enlisted	1,328,305	221,550	1,556,011	1,684,728
Officers	32,694	199	32,893	42,238
	.....	.....	1,588,904	1,726,966

[1] From beginning of examining, September, 1917.

3. Number of men given individual examination, 79,908; total to date, [1] 83,543.

4. Number of examinations: alpha only, 1,059,531; beta only, 393,404; both alpha and beta, 90,065; Point Scale, 18,732; Stanford-Binet, 38,489; Performance Scale, 23,119.

5. Number of grades below D: in alpha, 97,572; in beta, 95,715; in beta, following alpha, 6,682; individual—Performance Scale, 4,600; Stanford-Binet, 11,129; Performance Scale, 7,984; total, 23,770.

6. Mental ages: below 7 years, 4,780; 7 to 8, 7,875; 8 to 9, 14,814; 9 to 10, 18,878; 10 to 11, 12,631; 11 to 12, 6,480; 12 or above, 7,507.

7. Number of cases reported for: discharge, 7,800; service organizations, 10,014; development battalions, 9,487.

While the regular service of psychological examining was being organized, directed, and in every feasible way furthered by the Division of Psychology in the office of the Surgeon General, and while this work was being prosecuted in the greater part of the army training camps in the United States, every effort was made to meet demands for other kinds of psychological assistance, for it was the purpose of the psychological personnel to render maximal service to the military organization. The varieties of service requested by the army itself or by civilian agencies related to the army are extremely interesting and significant as indicating the trend of popular and military interest in psychological service and the initiative of examining staffs. Such miscellaneous service is described in section 5 of this chapter.

The practical uses of intelligence ratings are indicated or suggested at various points in this memoir. They may be enumerated here in contrast with the values originally predicted.

As originally conceived, psychological service within the medical department was to assist medical officers, and especially neuro-psychiatric officers, in discovering and eliminating men who were mentally unfit for military duty. It appeared, prior to actual trial, that reasonably well-planned methods of mental measurement should enable psychological examiners to discover mentally inferior recruits as soon as they arrived in camp and to make suitable recommendation concerning them to the medical officer. It was also believed that psychologists could assist neuro-psychiatrists in the examination of psychotic individuals. The proposed rôle of the psychologist then was that of assistant to the army surgeon; the actual rôle, as a result of demonstration of values, was that of expert in scientific personnel work.

In interesting contrast with the original purpose of mental examining, as stated above, stands the following account of the purposes actually achieved by this service: (1) The assignment of an intelligence rating to every soldier on the basis of systematic examination; (2) the designation and selection of men whose superior intelligence indicates the desirability of advancement or special assignment; (3) the prompt selection and recommendation for development battalions of men who are so inferior mentally as to be unsuitable for regular military training; (4) the provision of measurements of mental ability which shall enable assigning officers to build organizations of uniform mental strength or in accordance with definite specifications concerning intelligence requirements; (5) the selection of men for various types of military duty or for special assignments, as, for example, to military training schools, colleges or technical schools; (6) the provision of data for the formation of special training groups within the regiment or battery in order that each man may receive instruction suited to his ability to learn; (7) the early discovery and recommendation for elimination of men whose intelligence is so inferior that they can not be used to advantage in any line of military service.

Although it originally seemed that psychological examining naturally belonged to the Medical Department of the Army, and would there prove most useful, it subsequently became evident that this is not true, because the service rendered by psychological examiners is only in part medical in its relations and values. In the main its significance relates to placement, and its natural affiliation is with military personnel. For practical as well as logical reasons it would doubtless have been wiser had the service of the Division of Psychology been associated from the first with that of the Committee on Classification of Personnel in the Army, so that the psychological as well as occupational, educational and other important data might have been assembled by a single military agency and promptly rendered available for use in connection with the assignment of recruits. Thus also the organization of a special branch of the General Staff or of a personnel section of the Adjutant General's Office to deal with varied problems of military personnel might have been hastened and otherwise facilitated and the utilization of brain

power as contrasted with man power in the ordinary sense rendered more satisfactory early in the emergency.

When the armistice was signed and the examining of drafted men for the sake of mental classification ceased, the results of psychological examination were being used to excellent effect in the majority of camps, and there was every reason to predict rapid increase in the extent and effectiveness of practical psychological service during the remainder of the war. A general order, such as that presented on pages 56 and 57, carrying brief, comprehensive instructions concerning the profitable use of these ratings, would undoubtedly have placed the work upon a wholly satisfactory basis and would have assured very great increase of military efficiency through the proper placement and effective use, from the standpoint of brain power, of every soldier.

Because the psychologist is necessarily biased in favor of his own work it is essential that other evidences of military value than the assertions of those immediately responsible for this service be presented. Among the most significant of these evidences are the opinions of commanding officers. These were secured from the majority of stations in which psychological service existed after the work had been thoroughly organized and the officers had been given opportunity to acquaint themselves with its organization, relations to the military situation, and its practical usefulness. Whereas the reports from commanding officers received by the War Department in connection with the investigation of psychological service were predominantly unfavorable, those subsequently secured, in many instances from the same officers, by special request of the Surgeon General, were almost invariably favorable and contained constructive suggestions. The reason for this radical difference in the nature of the opinions is the prematureness of the original request for report. The psychological service had not been organized at the time, and where it did not exist, it was naturally enough assumed by responsible officers that report on psychiatric work was desired.

Since it is impossible adequately to summarize the opinions of commanding officers, section 4 of this chapter is devoted to them, and they are quoted at sufficient length to assure both fairness and adequacy of presentation.

SECTION 4.—*Official opinions concerning the military value of examining.*

In the preceding chapters considerable material bearing upon the topic of this section has been presented.[1] Letters and reports, already referred to, give evidence of the good general impression created by the initial and intermediate stages of psychological examining. Fortunately there are available also expressions of opinion of commanding generals and others at a much later date, when longer experience under much more varied conditions had furnished a thoroughly sound basis for judgment as to the net value of the work. The further fact that these later opinions are greater in number and that they form a complete and entirely unselected series, makes certain that the following account is quite unprejudiced.

In September and November, 1918, a letter substantially as follows was sent by the Adjutant General of the Army to the commanding generals of camps in which psychological examining had been in progress for a considerable time:

> The Division of Psychology, Office of the Surgeon General, especially desires your opinion on the value of psychological examining in your camp, and suggestions concerning ways of increasing the value of this service.

Eleven letters and 12 indorsements were received in reply to this request. In so far as is practicable these replies are reproduced exactly. In several cases where inclosures of considerable length accompany the replies and especially when they recite facts already embodied in this report instead of opinions, the inclosures have either been omitted or summarized.

Seven letters had been received from commanding officers of camps or divisions prior to the issuance of the special request mentioned above. These added to the 11 letters and 12 indorsements give a total of 30 responses from commanding officers. Of these replies 27 (approximately

[1] See reports of Col. Shaw, pp. 19ff.; summary of company commanders' reports, p. 25; report of the training committee, pp. 25f; quotations from Mr. Dorr's report, p. 45; and quotations from Col. Burt's report, pp. 46f.

90 per cent) are favorable. Of the 23 letters and indorsements quoted below, 12 are definitely favorable, one is definitely unfavorable, and one is favorable on condition that the work be done in a more advantageous manner.

Whereas in the first instance, as mentioned on page 25, company commanders in National Army cantonments were favorable to psychological examining in 75 per cent of the cases, commanding generals, on the whole more familiar with the psychological service and in possession of the critical judgments of numerous subordinates, reacted favorably in more than 90 per cent of the cases on record.

REPLY (LETTER) FROM COMMANDING OFFICER OF CAMP GREENLEAF.

The work of the Division of Psychology has been very carefully studied by the undersigned, and the following conclusions have been arrived at.

The system used, which is practically a mathematical determination of the intelligence of the soldier, is very satisfactory, and the results are, as far as can be determined by such means, fairly accurate.

The following criticisms should be made of this work. In the first place, the psychological department works considerably under the impression that their determinations should be used as the controlling factor in the assignment of officers and the appointment of noncommissioned officers in the Army. This can not be, for the simple reason that a man's character or initiative can not be determined by any such test; and frequently a man of high intelligence has not the other attributes necessary to make him a really efficient officer. Furthermore, this work is now being done by quite a number of men whose entire time is supposed to be taken up by these tests, making an expense to the Government which is not justified by the results obtained. Also, this department should be criticized on the ground that higher psychology, which is the study of the men more in detail and at length, is not attempted by this department, and therefore a great deal of the real value of psychological study is lost.

It should not be understood that this criticism is destructive, but it is considered that the work, as conducted by the Psychological Division as at present ordered, is too narrow to give real value to the Government, and if it should be continued a wider application of such psychological work should be attempted and a departure made from the solely mathematical determination of intelligence.

REPLY (LETTER) FROM COMMANDING OFFICER OF CAMP HANCOCK.

Reference letter from A. G. O. dated November 22, 1918. In order to make the desired report of more value I have called on the various officers here most concerned in the training, instruction and handling of troops for an expression of their opinion of the value of psychological examinations, together with any suggestions that these officers might have as to ways of improving and increasing the usefulness of this work. I enclose herewith separate reports from 14 different officers, which I think will be found of interest and value. It will be noted that of the 14 reports only one is unfavorable to a continuance of this work.

In my opinion the work has a distinct value in connection with the training of recruits, and especially in the case where large numbers of untrained officers and men must be organized and trained with a minimum of delay. In this camp psychological examinations have been found of considerable value in connection with the selection of noncommissioned officer material, and also in the selection of men for attendance at various schools. These examinations are found of value in sorting and classifying the men in the various companies to which they may be assigned, in that it permits of the immediate separation of the mass of recruits of which the company is composed into different groups of varying degrees of intelligence so that each group can receive special treatment according to its peculiar needs. In this way the progress of training is facilitated. * * *

In conclusion I deem that the psychological examination of officers and enlisted men, especially where these examinations can be held as promptly as possible after induction into service, has a distinct and practical value in the training of troops especially where time is a factor and it is necessary to utilize the services of inexperienced officers in the organization and training of large bodies of men.

The following are the 14 reports referred to in paragraph 1 of the preceding reply:

(1) FROM THE CAMP SURGEON.

(*a*) It is believed that the psychological examinations have a definite and considerable value in the rapid determination of the mental acuity of enlisted men and officers entering the service. It is believed that in the absence of personal contact and experience with an officer or enlisted man, the psychological rating offers the best method of judging at once the possibilities of that officer or enlisted man.

(*b*) In purely medical work the psychological examination of every officer and enlisted man has a definite value in that cases of subnormal mentality and many cases of mental disease are detected thereby, and as a result are referred for more definite examination to the neuro-psychiatric examiner.

(2) FROM THE CAMP PERSONNEL ADJUTANT.

At the present time psychological ratings are being used in this office principally that we may have another line on a man in selecting him in filling requisitions for specially qualified men.

I believe, however, that psychological ratings could be made of very great use, and, as I see it, there are two main ways in which these ratings could be used to advance the efficiency and usefulness of the machine gun training center.

(*a*) Ratings can be made of very great value to the personnel office,and I presume also to the operations section in the original assigning and placing of men. This applies not only to specialists, but also to men undergoing machine-gun training.

(*b*.) Ratings can be used by company commanders and other unit officers who are directly in contact with the men. It is very frequently necessary for such officers to use what might be called "snap judgment" in placing a man, and the psychological rating which gives a line on the enlisted man's mentality would be useful for this purpose. It has been demonstrated that in a large percentage of cases a practical try-out of a man substantiates the value placed on him by his psychological rating.

I believe psychological ratings should be given consideration in the formation of new machine gun classes. One of the difficulties is that some enlisted men take up this training and learn it much more rapidly than others. This is chiefly due to a difference in mentality. In order, therefore, that apt men may not be delayed in their training and held back by those men who learn less readily, I suggest that in the formation of training units, men of higher mentality be grouped together in one class; those of slightly lesser mentality in another; and so on down the line. In this way, I believe the training of the men could be speeded up to quite a marked extent, and all recruits would be trained as rapidly as their individual ability permitted. Information reaching this office from Washington states that eight commanding officers have already directed that this procedure be used in forming organizations within their command.

In the formation of the permanent personnel and the reorganization which is at present going on, the psychological ratings could be used to equalize the mentality of the various organizations.

I suggest that the camp psychologist be authorized and directed to immediately examine all men for whom there is no rating on record. The ratings of the men examined shall be reported to the camp personnel adjutant for use at headquarters, and an extra copy shall be furnished to the company commander for his information.

(3) FROM COMMANDING OFFICER, MAIN TRAINING DEPOT.

In my opinion these examinations should be made as soon as recruits join and their ratings put on service records. This will be of great value in the selection of noncommissioned officers in new organizations and in old organizations. It is my opinion that noncommissioned officers should never be made without reference to psychological ratings. All things being equal the high rating should govern.

(4) FROM COMMANDING OFFICER, GROUP NO. 1.

In my experience with men examined by the psychological expert, I have found the results very helpful in electing men.

In no case have I found their classification in error.

Men who were rated high turned out to be of superior intellect, and those in the D class were slow to learn and fit only for labor.

(5) FROM COMMANDING OFFICER, GROUP NO. 2.

The psychological examination of enlisted personnel of this command has been of the greatest assistance to company commanders in making their selection of noncommissioned officers.

(6) FROM COMMANDING OFFICER, GROUP NO. 3.

I have had numerous chances to test the value of psychological examinations, and found, with but one exception, that it was an easy and quick way to place the proper man in the proper place, not knowing the man at all.

The instance I cite, I had occasion to pick out from a new draft 120 men as prospective machine-gun instructors and material for noncommissioned officers. This I derived entirely from psychological report. One man failed to qualify as machine-gun instructor.

Suggest that each recruit as he enters the service be given this examination and a card properly filled out be forwarded with his papers, which would allow his company commander to place him where he belongs and not retard the progress of other men in his organization.

(7) FROM COMMANDING OFFICER, GROUP NO. 4.

The results of the psychological examinations have not been an infallible guide in the appointing of noncommissioned officers, but have always received consideration and have been of great assistance in picking fit men for noncommissioned officers.

(8) FROM COMMANDING OFFICER, GROUP. NO. 5.

In the first place, from my own observation, the ratings given by the psychological board are very inaccurate For instance, a man in this group who holds certificate as air pilot and observer was examined by the board and given a rating, which, if I remember correctly, was C minus 73. This man was reexamined later and given another rating, which, I believe, was C plus 250. It seems very improbable that a man qualified to fill the positions of air pilot and observer should not have a higher rating than C minus 73.

Part of this inaccuracy I believe to be due to the fact that the room in which the examination is held is filled too full of men. As a result, the men who are sitting in the rear of the room are unable to hear clearly and thoroughly enough to understand the instructions.

From my own personal observation and experience I have found that it is practically impossible to rely on the ratings given by the psychological board. Men who are below the average, when it comes to the question of service, are given higher ratings by the board, and vice versa. The records are of no use when it comes to picking men for certain positions.

Another thing which I believe enters into the examination, in a great measure, is the element of chance. It may be that a man is examined on a day when he happens to feel at his best, and everything may work smoothly. Should he be examined again the next day his faculties might not at that time be as keen, and his rating would not be as high.

Recommend that when these examinations are given there be not more than 15 men in each class.

(9) FROM COMMANDING OFFICER, GROUP NO. 6.

The psychological examination record is of great value when properly used and eliminates chances of error in selecting men for specialized work. An officer not acquainted with the enlisted men in his command, or one called on to select noncommissioned officers on short notice, should make his selection from those men with A or B grades who most strongly impress him on being interviewed.

Men having grades of D or E seldom have the potential qualities for making noncommissioned officers. However, men with grades of C who give a favorable impression on being interviewed, sometimes make good noncommissioned officers. The assumption is that men in the latter class were under a strain when they took the examination. It is suggested that a second test be given these men on recommendation of company commanders.

Again, it is to be observed that men who have been out of school for several years do not make so high a grade in these examinations as do younger men recently out of school, even though they display more intelligence. It is questioned whether the examinations do not deal too much with the scholastic and not enough with the practical to be a fair unit of measure for all soldiers.

It is suggested that company commanders be urged to consult the psychological records more frequently than they do in making appointments and assignments to special duty.

Selection of men for practical work, trades, etc., should not be limited to selection from psychological grade.

(10) FROM COMMANDING OFFICER, GROUP NO. 7.

Psychological ratings of about the first thousand men received in this group were very satisfactory, and were of considerable assistance in determining the assignment of acting noncommissioned officers in this group.

The psychological examinations of the last 500 men received in this group were very unsatisfactory, owing to the fact that a great number of these men were illiterates and the examinations conducted were not a fair test of the intelligence of the men for that reason. Would suggest that different methods might be used in examining men who can not read and write, so that commanding officers might get a better idea of their intelligence other than from a standpoint of literacy.

The result of the examination of the last 500 men received in this group showed nearly all of them to be in class E, and actual experience has demonstrated that a number of these men were far more intelligent than their classification would seem to indicate.

(11) FROM COMMANDANT, TRAINING CENTER SCHOOL.

It is my opinion that these examinations have a distinct value as indicated in a memorandum from psychological examining board on the subject of proof as to the validity of psychological grades.

It is my opinion that all men as soon as they shall have reported at this camp should be given this examination and the reports immediately placed in the hands of their company commanders. This gives the company commander at the outset a true index of the personnel of his company that could be used with slight fear of error in making his first selections of noncommissioned officers. The next important application of the results of these tests lies in the selection of men to attend the machine-gun school or for admission to training schools for officers. It is my opinion, based upon tests and experience at the machine-gun school, that no man should be selected for admission to the machine-gun school for training as a noncommissioned officer in machine-gun work whose grade in his psychological test is that of C− or lower. It is also my opinion that no man who fails to procure a grading in the psychological test below that of grade C+ should be selected for designation to attend a training school for officers or to attend the machine-gun school.

Had this principle been applied at the machine-gun school much valuable time would have been saved, and the limited number of instructors available would have been liberated for other classes.

(12) FROM COMMANDING OFFICER, CENTRAL OFFICERS' TRAINING SCHOOL.

The results of psychological examinations have proven of much value to this school in determining the qualifications and fitness of certain doubtful men for commissions. In the large percentage of instances the result of the psychological examination has coincided with the result of the candidate's written examination mark. Would suggest one way of increasing the immediate usefulness of this work would be to require every soldier to take this examination and to impress upon officers the value of this means of discovering men.

(13) FROM COMMANDING OFFICER, DEVELOPMENT BATTALION.

The chief value of the psychological examinations is that they afford company commanders a quick and relatively accurate method for determining the intelligence of the enlisted men. This makes it possible for the company commander to utilize his most intelligent men for important work at once, without resorting to the "try-out" method. Mistakes in the choice of men are not entirely eliminated but they are reduced.

In the disciplining of offenders the psychological rating of the soldier is considered.

I would suggest that the psychological examination be very closely supervised by commissioned officers, and that the ratings be supplemented with remarks pointing out any matters of special importance observed in the soldier.

I do not believe that the results of the psychological examinations, as I have observed them, justify the expenditure of the time and money used for that purpose.

(14) FROM COMMANDING OFFICER, BASE HOSPITAL.

The writer has had no practical and personal experience with psychological examinations as applied to the Army. There is no doubt, however, as to the value of psychological examinations if thoroughly done by an expert. A thorough psychometric test, however, requires not less than one hour's time to each person examined, making it almost an impracticable procedure for application to a large number of soldiers, except in selected cases.

To rate a man's mental capacity upon the basis of the usual army psychological examinations alone is hardly fair. Many neurotic individuals, distinctly unfit for service, obtain high ratings in these psychometric tests. The tests, as given, measure mental alertness rather than mental capacity and general fitness, and unless these examinations are properly weighed in the light of the soldier's general ability, they are in a great many cases likely to injure rather than to improve the service.

The writer feels that with his limited practical experience in the application of the psychological examinations to the Army he can not justly make any suggestions for improving and increasing the immediate usefulness of this work.

REPLY (LETTER) FROM COMMANDING OFFICER OF CAMP LEWIS.

It is considered that the psychological examinations are of great value as an aid in determining the proper placing of the personnel of the command. They should be used as a guide, however, in conjunction with other means of information, and not as an infallible rule. Examinations have proven of great value as follows:

(*a*) As a basis for classification of men by company commanders for special duty, special training, tentative selection of noncoms, officers, etc. While intelligence is not the sole criterion of a recruit's usefulness in the future, and while an officer can undoubtedly classify his men after some acquaintance, the rating considerably expedites the process of organization and classification.

(*b*) Use of intelligence ratings by personnel officers as an aid in classifying men as experts, journeymen, or apprentices (a man of high intelligence needs less time to learn a given trade); and in assigning men to permanent organizations in order to maintain evenly balanced groups.

(*c*) Determination of mental age in cases of low or defective intelligence, thus giving a basis for recommendation for rejection or for acceptance for full or limited service.

(*d*) One of the most important services has been to assist in selecting candidates for officers' training schools. It was demonstrated that a certain minimum of intelligence was essential to success in the training school, and that candidates failing to reach a given psychological rating failed to receive commissions. Approximately 17 per cent of the candidates of the fourth officers' training school were thus eliminated by purely objective standards with considerable saving to the Army.

(*e*) Examination of men who are inapt or troublesome to organization commanders, thus giving a basis of recommendation for discharge (on account of mental deficiency) or for transfer to the development battalion.

(*f*) Assistance to the morale officer in the stimulation of morale.

Suggestions for improvement are offered as follows:

(*a*) The intelligence rating now conducted by the psychological board should be taken over by the Committee on Classification of Personnel or whoever succeeds this committee. The classification of personnel according to intelligence is more closely related to the personnel officer's work than to the medical service.

(*b*) When voluntary enlistments for the Army are resumed, an officer trained in clinical psychology to be assigned to each recruit depot.

(*c*) It would seem that the psychological rating should be coordinated with the rating scale for officers, in so far as the intelligence rating is concerned. Experience demonstrates that where the intelligence rating is done in accordance with instructions, it corresponds very closely with the alpha examination rating. If several officers rate a group of officers it is found that the examination is the nearest single measure for the combined result. At best, therefore, it is as good as the subjective judgment of superior officers and it has several advantages. It is objective and impartial, and it is uniform.

REPLY (LETTER) FROM COMMANDING OFFICER OF CAMP LOGAN.

I have no recommendations to make as to ways of improving or increasing the immediate usefulness of this kind of personnel work; this provided the present regulations on the subject are carried out. The difficulty which I have found is that many soldiers and officers arrive at this camp without any indication of psychological examination. I believe the examinations are valuable in organizing new units, and that the method of assigning men to these units by occupation and psychological rating is far better than the old method of assigning men in bulk.

A previous camp commander had already written:

The psychological work done and being done by Captain ——— in this camp has been consistently good and has proven of much practical value.

At first, due to the innate conservatism of line and even medical officers, his task was a rather uphill one; but now, largely due to his own energy and tact, and to the thoroughness and honesty of his work, practically all officers here have been convinced of its practical value and unique assistance in rating, sorting, and disposing of the divers kinds of men as well as officers who pass through such a camp.

In addition to his ordinary duties of testing and rating the personnel of organizations, he has been employed in making numerous special examinations, where the handling and disposition of men whose cases involved obscurities of mental and physical peculiarity or weakness were in question. The lucid solving of such human problems by the methods of his peculiar art and his personal acuteness and persistence have often relieved such perplexities.

I consider such an expert and his specialty among the most useful aids lately given the Army toward the scientific and nonwasteful utilization of man power.

REPLY (LETTER) FROM COMMANDING OFFICER OF CAMP SHERIDAN.

It is believed that the psychological test, when properly applied, is of great value. It is being used to some extent in regiments as an aid in the selection of noncommissioned officers. In my opinion this should prove of great practical benefit when more thoroughly understood and more generally applied.

It is recommended that the division of psychology prepare and distribute to all officers of the Army, or to all organizations, a brief list of the practical rules followed in these examinations with an explanation of the purpose of these several tests.

In normal times it is believed that recruits received at depots should there receive this test given by experts and the ratings shown on their descriptive cards. Such recruits as may be received in companies, and who have not previously been tested, should be tested without delay in order that the records may be complete and the proper benefits derived from this rating.

Candidates for commission should be required to take the test and should not be accepted if rated lower than B, except in special cases where fitness for special work is well demonstrated.

Among the benefits to be derived from complete rating of a command is the possibility of averaging the intelligence in the several units. It also enables selection to be made so as to provide proper intelligence for the various technical services. There are many other advantages which are so obvious that it is unnecessary to state them here.

REPLY (LETTER) FROM COMMANDING OFFICER OF CAMP ZACHARY TAYLOR.

First. There seems to be a general impression among both line and medical officers to the effect that the psychological rating of officers and enlisted men is a good thing and that it gives a more or less accurate indication of a man's mental capacity.

Second. The officers interviewed do not seem to have a very complete idea of the extent to which this service may be used or to appreciate what its possibilities are, the general impression being that it is probably a good thing, but that it has not been put to any great practical use, and that it has not been long enough in use for anyone to form a definite opinion.

I would suggest that if it is intended for those who are directly in command of troops to actually use the findings of the psychological board in assisting them to place men under their command in the places for which they are mentally capacitated, that some method should be devised whereby they could receive better instruction in the use of the gradings and that the information secured by the psychological examiners be brought directly to their attention, together with the conclusions which the examiner may reach in each case. In most instances the mere grading of a man with a numerical rating does not indicate any particular thing to the officer who is in direct control of the man, his assignment, and his work.

It has come to my attention that the psychological gradings are entered only on a man's qualification record card, which remains either at camp headquarters or at his regimental headquarters, and are therefore not in the hands of the officer who has immediate control over the details and assignments which are given to the individual soldier. If it is required that the company commander in every instance must go to regimental or higher unit headquarters to determine the psychological rating of the man under his command he is more than liable to permit this difficulty to cause a neglect of the use of the psychological ratings, whereas if the ratings were directly in the hands of the company commander at all times the use would undoubtedly be more nearly universal. I would suggest that some means be provided whereby results of the psychological test may be communicated directly to the organization commander who has immediate control of the soldier and his assignments and that some means be provided whereby this rating can accompany the soldier as a part of his permanent company or detachment record separate and aside from the entry made on the qualification record card.

REPLY (LETTER) FROM COMMANDING OFFICER OF CAMP TRAVIS.

The camp personnel adjutant and his assistants have found the psychological ratings of great value in selecting men for duty at the personnel office and in choosing noncommissioned officer material.

In the filling of requisitions from the War Department, which require consideration of the general intelligence of individuals or groups of men, the psychological ratings have been found to be of very great value. For instance, in filling requisition 11,019, dated August 1, 1918, requiring the transfer of 1,700 colored troops to the 24th Infantry for combat purposes, these 1,700 men were selected solely on their psychological grades. Company commanders of this camp report that colored troops selected for combat service on a psychological basis of grades higher than

grade E, after drilling such troops, that they believe the men were carefully chosen, and many such company commanders desired to know on what basis these men were chosen.

The 332d Labor Battalion was filled by the selection of the men on their psychological grades, and a number of noncommissioned officers for permanent personnel in the depot brigade were chosen on this basis, and it appeared that the results were satisfactory.

It is believed that the psychological ratings were extremely valuable.

It is suggested that if particular psychological tests were worked out for testing men for use in specific military duty, and in determining the psychological requirements of specific military duties, extremely valuable results would be obtained.

Under the present plan of determining the intelligence of officers and enlisted men only their general intelligence is attempted to be rated. If intelligence tests for specific jobs could be worked out, and no doubt they can be, an important advantage would be gained, and much loss of time and energy in training men for specific duties would be avoided.

REPLY (LETTER) FROM COMMANDING OFFICER OF CAMP UPTON.

The psychological examination held at this camp has proved a value to the various departments which had to do with the assigning of enlisted men to various kinds of work. It afforded quick classification of men to the particular kind of work for which they were adapted. A careful individual examination has been given every case in the psychopathic wards at the base hospital. This examination, reported in the form of exact mental age of the subject, has been used by the neuro-psychiatric board in their recommendations for discharge upon the basis of mental deficiency. An individual examination has been given to all prison cases, reports being placed in the hands of commanding officers, showing mental ages of the soldiers who have broken rules. Examination of all members of development battalions has resulted in the classification of illiterate groups, aiding the work of education. Candidates for officers' training schools have been examined and the results of their examination have been used as a basis in the selection for intensive training. Results of psychological examinations have been placed in the hands of company commanders and have enabled them to select provisional noncommissioned officers from material which was shown to be intellectually superior. It is true that general value to the service usually goes hand in hand with intellectual development and usually the most intelligent man the man with the highest mental rating, is of the greatest service. Of course, there are exceptions to this rule.

The usefulness of psychological service can be improved in the matter of closer cooperation between the psychological board and the personnel adjutants. It is essential for the best interests of the psychological service that the intelligence ratings be placed on the qualification cards of each and every man examined. Unless this policy is adhered to the entire purpose of psychological examining is defeated.

Psychological service was instituted with a view of aiding the rapid development of soldiers by eliminating the unfit, and placing in the hands of personnel officers information which will enable them to distribute men efficiently. The value of continuing the work becomes doubtful when the influx of recruits is stopped.

REPLY (LETTER) FROM COMMANDING OFFICER OF CAMP WADSWORTH.

I have been very favorably impressed by the work of the examiners, am convinced of its usefulness to the service, and desire to make but one suggestion for its improvement, namely, that it be transferred to the personnel branch of The Adjutant General's Office, where it obviously belongs.

It is likely that we have had better opportunities for testing the value of psychological examinations at this camp than at other places, and that, therefore, the examiners and other officers have been more interested in the subject, have accumulated more data, and have devoted more time and labor to the investigation of results obtained.

From January until May of this year we had approximately a full complement of officers for about 16 regiments of pioneer infantry, but very few men. That period was therefore devoted to the instruction of all officers in various subjects, such as guard duty, administration, military law, field service regulations, drill regulations, field engineering, etc. Using the general standing of officers in this school work in comparison with their psychological rating some very interesting and instructive comparative tables were compiled by the examiners. These tables have been forwarded to the Division of Psychology, and it is thought that they should convince any doubter of the very great value of psychological examinations in determining valuable officer material.

The noncommissioned officers were, of course, subjected to the same psychological tests, and the results were equally convincing. The regiments mentioned were fragments of New England and New York National Guard Regiments, which had been depleted to fill to war strength the New England and the New York divisions. As the division commanders were not authorized to take noncommissioned officers, some of the commanders of the depleted regiments made noncommissioned officers of very inferior material in order to protect from selection certain privates whom they especially desired to keep. These men were invariably shown up by the psychological ratings; indeed, it was their low rating which caused me to make inquiry about these men and to learn of the above facts.

When the drafted men came in their psychological ratings were utilized by all company commanders to determine the likely material from which to expect noncommissioned officers, and I was informed that it proved to be a very valuable guide.

From the experience above briefly narrated I have learned, after some scepticism at first, to have a very wholesome respect for the work of the psychological examiners, and can not too highly commend it. In this connection,

however, it should in all fairness be stated that the examiners at this camp have devoted themselves with the utmost diligence and enthusiasm to their work, and have thus attained results which very likely would not have been discovered by less able and zealous men.

REPLY (LETTER) FROM COMMANDING OFFICER OF CAMP DEVENS.

The reports of psychological examinations have been of value and assistance in this camp, in connection with other data relative to the efficiency and qualifications of officers and enlisted men, specifically as follows:

In equalizing the average intelligence of companies and entire units at the time of original assignment and to some extent subsequently.

In the selection of men for certain technical units in which men of low grade intelligence have been reduced to a minimum and an increased proportion of men of superior intelligence has been provided. This was done specifically in machine-gun battalion and the machine-gun companies of infantry regiments.

In calling attention to certain officers and enlisted men of high or low grade intelligence who had not been previously noted.

In assisting the psychiatric examiners in finding men of deficient mentality upon coming into the service.

In enabling organization commanders to obtain an early estimate of the capacity of their men which otherwise would have required a period of observation.

It has been found, however, that the psychological rating should be used as one of several indications of the military usefulness of an individual, but not as a final criterion, as a number of individuals have been found with high ratings who are of but little military value and a number of the most efficient officers and enlisted men have had comparatively low ratings. The average man in grade B has been found as valuable to the service as one in grade A.

It is believed that the present test lays too much stress on quickness of thought and not enough on judgment, leadership, courage, and dependability. The tendency of the test is to under-emphasize these latter qualities and results in misunderstanding on the part of those who attempt to interpret the ratings.

REPLY (LETTER) FROM COMMANDING OFFICER OF CAMP CUSTER.

The value of these examinations is almost always overrated or underrated. Generally speaking, the officer of long Regular Army experience rejects them as being valueless and his opinion is very apt to be at once adopted by any young officer who learns it. The new officer, if left to himself, accepts the results of this examination as final and conclusive and gives to the matter an unjustified value that often leads to his disappointment; and the net result in either case is a feeling of prejudice against psychological examinations, and this, I believe, is the general attitude of the service with reference to the matter.

If an authoritative statement as to the purpose of these examinations, the value to be placed upon the results thereof, and how this is to be used in the service, has been ever issued by the War Department, it has failed to come to my notice or to the notice of anyone with whom I have talked on the subject. In most camps the psychological examiners issue literature on the subject, and it is my opinion that rather more is claimed by them than the case justifies, and it is a well-known fact that many surgeons of the Army, and particularly the members of the psychiatric boards, are not in accord with the claims of the psychological examiners, and the expression of their opinions weakens the value of these examinations with the service.

I would suggest that the War Department issue a memorandum explaining briefly the purposes of psychological examinations and what the results of such examinations indicate, and that some definite system be adopted as to the ratings given those examined, and that this be published. There seem to be both alphabetical and numerical ratings at the present time, for one sees a rating of A, B, C, on an enlisted man's card, and, for example, a 192 on an officer's card, and most officers do not know what one or the other may mean.

I believe the service should be informed very definitely that the psychological test is the measure of a man's intellectual level at the time of examination, and that if a man be in a different physical or mental condition, the results might differ and that these examinations deal with one quality only, that is mentality, and do not show that a man has the essential attributes of character, leadership, etc., that are requisites in a good noncommissioned officer.

In connection with these examinations I might mention that I once heard a very able psychiatrist, now in the service, say that certain psychological examinations that he had seen conducted were not of value because the psychological examiners left this work to enlisted men, who were not capable of observing those being examined, and what was put down on paper was all that was considered. This gentleman stated to me that for the past six years in his private practice he had used the psychological test in making a diagnosis, and that the subject's behavior and actions during the test were quite as indicative of his intelligence as was what was placed on his paper, and that in the psychological test held in the Army this factor is greatly neglected.

I have been convinced for a long time that with our large number of new officers these tests have a considerable value, or rather would have if the tests were properly conducted, and if their exact meaning were made known. As the matter now stands, it is unsatisfactory, for it neither deserves the contempt with which it is treated on the part of some, or the belief in its infallibility which is held by others.

The ignorance of the subject on the part of the average officer is equaled only by his indifference to it.

REPLY (INDORSEMENT) FROM COMMANDING OFFICER OF CAMP BOWIE.

(This indorsement returns a report of the chief psychological examiner with approval. The report is, of course, favorable, and recites the practical uses being made of intelligence ratings in that camp.)

REPLY (INDORSEMENT) FROM COMMANDING OFFICER OF CAMP DIX.

The continuance of these psychological examinations by psychological officers is not recommended. They are expensive and consume considerable time. Few cases are discovered by the psychological officers which would not be found by the neuro-psychiatric board, regimental medical officers, or company officers.

Because of the purely mechanical nature of these examinations and the lack of personal contact they are of little value in determining whether or not a recruit is of the proper material to be transferred into an efficient soldier.

It is thought these examinations can be made by the regular medical personnel.

REPLY (INDORSEMENT) FROM COMMANDING OFFICER OF CAMP DODGE.

(Indorsement forwards a report of the chief psychological examiner, giving information concerning psychological service in the camp.)

REPLY (INDORSEMENT) FROM COMMANDING OFFICER OF CAMP GRANT.

I have been in contact with this work too short a time to give a valuable opinion on the value of the psychological examination. I can see, however, a great value in it, and concur in the recommendations of the camp surgeon. I especially agree with him in that the enlisted personnel working under the psychologists be neither transferred nor frequently shifted, as it disrupts the efficient working of the office.

The recommendations of the camp surgeon referred to are as follows:

Psychological examinations as conducted at this camp have been of the greatest value to the service. By their group examinations they locate the mental defectives and materially assist the neuro-psychiatrists in arriving at diagnoses of certain doubtful cases. The special work they are doing weeds out at the physical examination many of the men who would later have to be discharged on surgeon's certificate of disability.

The work of the psychologists is of very great value to the personnel division, as it assists them in determining whether or not men have sufficient mental ability for positions to be filled.

It is suggested that the psychologist be given time to examine the new draft increment before they come to the medical boards. This is now being done here, as this will enable the neuro-psychiatrists to eliminate many low-grade men; also that the enlisted personnel working under the psychologist be not transferred nor frequently shifted, as it takes weeks of training to accustom a man to do this work satisfactorily.

REPLY (INDORSEMENT) FROM COMMANDING OFFICER OF CAMP HUMPHREYS.

In the opinion of the undersigned, the work of the Division of Psychology in this camp has been very satisfactory and the results such as to fully justify the time and energy required to make the examinations. It is believed that the greatest value of these examinations will be in connection with the bringing of large groups of men into the service for periods of intensive training, as the psychology test affords, in the shortest possible time, a means of grouping the new men into classes based upon their intelligence. The undersigned has no suggestions to offer at this time looking to the improvement or the increased usefulness of this work.

REPLY (INDORSEMENT) FROM COMMANDING OFFICER OF CAMP KEARNY.

My own opinion, based upon observation at three camps, is that organization commanders believe the system is all right when they secure good men, and all wrong when they receive poor men.

I believe the system is advantageous on the whole in assigning men, in the first instance, and picking out desirable men; but when it comes to the less desirable and less educated men a great deal of dissatisfaction results.

Moreover, some men who pass a very poor examination are often good men and prove valuable in practical work; others who pass fairly good tests prove of little value.

I am of the opinion where haste is necessary in picking out and assigning men the psychological examination is of much assistance, but am of the opinion also that the final test by the man's actual work in the organization is the valuable one.

REPLY (INDORSEMENT) FROM COMMANDING OFFICER OF CAMP LEE.

My opinion as to the value of psychological examinations at this camp is expressed in the inclosed memorandum prepared at my request by the camp personnel adjutant, and forwarded by me to the chief psychological examiner under date of September 5, 1918, as indicated.

The usefulness of the work of the psychological examiner would probably be increased if all cases of possible feeble-mindedness among enlisted men were regularly referred to him for diagnosis. Such cases are found among prisoners of limited intelligence, men recommended for assignment to development battalions whose deficiency may be due either to permanent mental incapacity or to temporary retardation, men recommended for rejection or discharge from the service by reason of feeble-mindedness.

The psychological examiner is now working along these lines, as well as in the assigning of mental ratings to enlisted men in general, but instructions should probably be issued establishing such work as a part of the regular routine.

The memorandum referred to follows:

The functions of the psychological examination now in use are threefold:

1. To aid in eliminating the mentally unfit.

2. To assist the personnel adjutant in re-interviewing and selecting men of special qualifications required by War Department requisitions.

3. To assist the organization commanders in selecting men for responsible positions.

In a replacement camp the first two are naturally the more important * * *. As high as 3,000 men may be handled in one day * * *.

The newly drafted man is usually examined on the day following his arrival. Report of the results of the examination is promptly made to the personnel adjutant and the chief medical examiner in the mustering office. Those men whose ratings indicate that their intelligence is so low as to render them unfit for military service are given a special examination by the examining board and where the medical examination confirms the finding of the psychological examiner, the drafted man is discharged from draft as unfit. In this way the psychological examination materially assists the medical board by weeding out those mentally incompetent.

Upon receipt of the reports from the chief psychological examiner the personnel adjutant causes the grade to be entered on the qualification card. In selecting men for the various requisitions the intelligence rating is always considered and greatly assists the personnel officer in making his selections. On the re-interview by the personnel officer, as in case of the physical examination, the psychological rating is never taken as final. It serves as a guide rather than the determining factor as men are often found to be skilled in a particular line and qualified to fill certain requisitions in spite of a low psychological grade. * * *

The officer candidates in the central officers' training school are all given the psychological examination, and the grade is used both in their training and in the final selection of those qualified for commissions.

The psychological examinations of recruits, officer candidates, and in certain instances of officers have been efficiently handled by the chief psychological examiner, and his assistants. It is believed the advantages outlined render the examination extremely worth while.

REPLY (INDORSEMENT) FROM COMMANDING OFFICER OF CAMP MEADE.

I am of the opinion that the psychological service is an excellent thing.

During the present war officers are thrown in contact with large numbers of other officers and enlisted men, to whom they are complete strangers. It is impossible to quickly form a knowledge of anyone's ability. Time, personal association or accident may show that a certain officer or enlisted man is worthy of advancement. We are constantly looking for intelligent men. The psychological test gives us something to start on, and I have used these psychological ratings on many occasions in the absence of a knowledge of the individual concerned. While I am firmly of the opinion that the psychological rating is excellent among new men, it does not take the place of the final judgment formed of an individual by personal contact and observation under difficult conditions. I would, therefore, consider it of the greatest importance for a just test of new men to subject them first to the psychological test. The final decision with reference to men who have passed such test will depend upon the result of the judgment formed of the individual after sufficient time had elapsed during which they were under observation. From my experience in different camps, I am of the opinion that enlisted men who rate below A and B class should not be considered as candidates for the officers' training schools.

REPLY (INDORSEMENT) FROM COMMANDING OFFICER OF CAMP PIKE.

I regard the work done by the Psychological Board as being very valuable. I, myself, have taken this examination to satisfy myself of its efficacy.

It affords a quick and accurate method of selecting men for officers' and noncommissioned officers' training schools, training cadets and otherwise, when a high grade of intelligence is desired, and of sorting out the mentally defective and those who are fitted only for limited service, or are worthless to the service.

This service can be improved by bringing it into close cooperation with the personnel work on classification and using these ratings in connection with skill tests and occupational ratings.

REPLY (INDORSEMENT) FROM COMMANDING OFFICER OF CAMP SEVIER.

The values of psychological examining in this camp are:

(*a*) In the prompt discovery of men whose superior ability recommends their advancement.

(*b*) In the prompt segregation in Development Battalions of intellectually inferior men whose inaptitude would retard the training of the unit.

(*c*) In furnishing measurements of mental ability which may be used to equalize the mental strength of the various companies and regiments within a given arm of the service.

(*d*) In selecting suitable men for various army occupations or for special training in technical schools.

(*e*) In eliminating the feeble-minded.

(*f*) In giving a prompt reliable index of a man's ability to learn, to think quickly and accurately, to analyze situations, to maintain a state of mental alertness, and to comprehend instructions.

The ways of improving and increasing the immediate usefulness of this new kind of personnel are:

(*a*) To continue the work along established lines, so that our new Peace Army may be adequately equalized with regards to mental strength within the various companies and regiments within a given arm of the service.

(*b*) To combine the psychological service, as now conducted, with the division of personnel so that future assignments, occupational or otherwise, may be made with due knowledge of the mental ability of the individual so assigned.

(*c*) To provide for grades for all psychologists, commissioned and enlisted, commensurate with their ability and training, compared to grades given in other branches of the service.

(*d*) To conduct schools of instruction for all officers so that they may be able fully to understand the value of mental tests, and how they may make use of all psychological ratings given.

(*e*) To provide more adequate quarters for psychological service.

REPLY (INDORSEMENT) FROM COMMANDING OFFICER OF CAMP SHERMAN.

[This reply invites attention to a report from the Camp Surgeon, which deals fully with the psychological activities at this camp. The report is too long for reproduction here, but the principal points may be given.

The report submits that "the variety of psychological service is an unqualified indorsement of its great value." Psychological ratings are effectively used (1) by the examining board for candidates for officers' training schools who use the ratings as "the most reliable index" of a candidate; (2) in officers' training schools for the elimination of men of average intelligence; (3) in the usual manner for draftees; (4) in the camp of conscientious objectors, where the rating indicates the manner of treatment required for the man, whether, as intelligent, he can be reasoned with, or, as less intelligent, he must be dealt with more autocratically; (5) in the development battalion schools in connection with organization, the selection of teachers, and the classification of students; (6) at the base hospital for both officers and enlisted men; (7) among the medical personnel of the camp, both officers and enlisted men; (8) in the Army Nurse Corps and (9) in the Student Army Nurse Corps for the selection of nurses; (10) with questionable women engaged in commercialized vice, whose responsibility and disposition require determination; (11) in the advance examination of prospective Y. M. C. A. workers; (12) in the examination of prisoners and drug addicts; (13) in constant cooperation with the psychiatrists in the determination of defectives and psychotic cases; and (14) in the examination of men in the Student Army Training Corps in institutions adjacent to camp. "There is no line of activity of major importance that has not called upon the psychological service for assistance. This assistance has been of such direct help and of such tried value, that the psychological service will be demanded with ever increasing insistence."

The report makes some further suggestion in line with increasing the scope of psychological work and incloses a detailed report upon the manner in which the treatment of conscientious objectors is based upon the intelligence of the men as determined by the psychological examination.]

REPLY (INDORSEMENT) FROM COMMANDING OFFICER OF CAMP WHEELER.

Psychological examinations have proven very useful in this camp. The results of these examinations have been used in numerous ways, and have separated, for instance, the combatant from the noncombatant colored troops by means of this test, using as a standard the mentality of a 10-year-old white child as a mimimum of intelligence necessary for fighting troops. In the general assignment of 17,000 men received in this camp during May and June, after first assigning the specialists, we used the psychological test as a basis for an even distribution of the men according to intelligence, so that no unit should receive an undue proportion of men of low mentality.

SECTION 5.—*Varieties of psychological service.*

The services which are listed and briefly described below were rendered by psychologists under the direction of the Division of Psychology of the Surgeon General's Office. The problem of the division, as originally conceived, was to provide for the examination of recruits at the larger camps in this country and to report the results of examination to organization commanders, medical officers, and personnel adjutants for their use and information. Soon, however, other originally incidental services were introduced. The preceding sections have outlined the principal service and touched upon some auxilliary services. (See especially Chapter 3, section 6, and section 4 of this chapter.) It is now the intention more systematically to outline the auxilliary services which ultimately came to be rendered to a variety of authorities and for a variety of purposes.

SERVICES TO ORGANIZATION COMMANDERS.

After psychological examination an alphabetical list of the men of an organization with their corresponding grades was made on special report blanks (see Report of Psychological Examination, p. 290). When possible, in divisional training camps, this report was delivered in person and discussed with the company commander by psychological officers. In some camps arrangements were made at an early date whereby psychological grades thus reported should be entered upon service records under "Remarks." At other camps this practice was forbidden until a final ruling from The Adjutant General of the Army was obtained which definitely permitted such entry. A mimeographed explanation of grades and scores (see p. 424) was attached to all reports. When the reports were not delivered personally conferences of all officers of the regiment were sometimes held. Explanatory talks were usually made when officers or officers' training camp students were themselves being examined.

Commanding officers in divisional and replacement units found the ratings of considerable service in making transfers and assignments of men within their units. Questionnaires and other means of securing information showed that the following were the chief uses made of the ratings by company commanders:

(*a*) Assistance in the organization of the company in cases where many new recruits arrived at one time.

(*b*) Assistance in the selection within the company of men for special duties; for example, company clerk, orderly, post exchange detail, etc.

(*c*) As a check upon the officers' personal estimate of men and to direct particular attention to men whose ability had previously been either overlooked or overestimated, Such systematic use of the ratings as the calling in of all A and B men for personal interview by the captain or the inspection of men grouped by platoons of A, B, C, D, and E ratings are sometimes reported.

(*d*) Assistance in the selection of noncommissioned officers, acting noncommissioned officers, and candidates for noncommissioned officers' schools. In many camps, this use either as a sole or partial basis for such selection, was made obligatory by camp order; in others, such an order was not found necessary; but in no camp, so far as is known, were psychological grades entirely disregarded in making such selection.

(*e*) Assistance in the selection of men for officers' training school. Until forbidden to do so by General Orders, No. 74, the commanding officers in certain camps issued orders that such candidates must have A or B or, in some cases, C + rating. In general, however, the psychological grade was considered simply as one of the chief factors to be taken into consideration. The assistance given by psychologists to officers' training camp officers is described elsewhere (see p. 118).

(*f*) In several camps special training groups, based upon psychological ratings, were formed; the group with the higher rating was given more intensive and rapid special training. A major, who assigned new recruits in his battalion into four groups, the A's, the B's, the C's, and the D's, thus describes the result of his experiment:

> I went out to watch the platoons that were classified on the basis of your intelligence ratings. I was interested in seeing whether I could pick out the different platoons and classify them as to rank on the basis of their showing on the drill field. I had no difficulty in picking out the best, the medium and the lowest platoons. However, I could not distinguish between the A and B group; both of them seeming to execute the drill equally well. This may have been due to the fact that the B group was small in comparison to the other three, and consequently, had received more individual and therefore, better training. It was very evident that there was an apparent difference between the other three groups. If I should have graded them, I would have given the D and D − group 50 per cent; the C + C and C− group, 75 per cent, and the A and B group 100 per cent. The A and B group would easily learn in one week what it would take the D and D− group two weeks to learn with the same amount of drilling each day. My plan was to rearrange the groups at the end of the first week, but I found no rearrangement necessary as the classification already made seemed to be correct. I watched the platoons in order to pick out any men who were not up to the standard of the group, but could not detect a single case that needed reclassifying.

This experiment was much more commonly tried in development battalions (see below). At Camp Gordon, the chief psychological examiner spent the greater portion of his time for several months advising and lecturing to officers on methods of training.

(*g*) Many company commanders reported that psychological rating was consulted by them and found of assistance in deciding what should be done in disciplinary cases. Thus a man with a low psychological rating might be presumed not to have understood the full meaning of the offense which he had committed, and might be given another company punishment merely instead of being brought before a summary court martial. Numerous examinations were made at the request of company commanders in cases of men who were giving trouble through apparent inability to learn, through misconduct and the like, and special recommendations for treatment were made by the psychologist.

(*h*) The uses made of the psychological examination of officers are mentioned elsewhere (see pp. 22f). It needs only to be indicated here that psychological grades were commonly considered by superior officers in making assignments of their subordinates to special duty, in recommending promotions, in courts-martial and in examining for discharge for inefficiency.

SERVICES IN DEVELOPMENT BATTALIONS.

Development battalions were first authorized in May, 1918. Their functions were "to relieve other organizations of all unfit men; to conduct intensive training with a view to developing such men; promptly to rid the service of all men who, after thorough trial and examination, are found physically, mentally, or morally incapable of performing the duties of a soldier." Psychological examinations in all camps resulted in the recommendation of a large number of men to such organizations on account of mental unfitness. In some camps orders were issued that no man should be so transferred without consideration of his psychological record. Later examinations inside the battalions themselves assisted the commanding officer and the medical officer in charge in the classification of men for training and other purposes. In at least eight camps special training companies in the battalion were formed primarily on the basis of psychological grades.

A War Department circular on "the instruction in English of soldiers who have not sufficient knowledge of the language," July, 1918, directed that—

> From time to time the Psychological Division, Sanitary Corps, will be called upon to assist to the best interests of the service in determining the rate of progress of slow learning men and the reasons for their backwardness, to the end that all practical and scientific means may be used to determine the best training that should be given those undeveloped mentally as well as educationally.

Accordingly in many development battalions psychological officers became to all intents and purposes educational directors. Numerous requests that special psychological officers be assigned for full duty in development battalions had to be refused on account of the insufficient personnel of the Division of Psychology. At the request of Col. Lentz of the General Staff, Capt. Paterson was assigned to the development battalion at Camp Meade to make a special study of the methods whereby psychologists could be of special service in development battalions. Capt. Basset and Lt. Houser were sent by their commanding officers to the school for officers of development battalions held at Camp Meade. Afterwards Capt. Basset was transferred to the infantry and placed in command of the development battalion at Camp Logan.

In the elimination of totally unfit men, after trial in the development battalion, psychological recommendations were considered even more carefully and given greater weight than they had been in the original examination of recruits. Thus two camps reported that some 200 men previously recommended for rejection by psychologists and nevertheless accepted for service, ultimately reached the development battalions and were quickly discharged for mental deficiency.

SERVICES TO PSYCHIATRIC EXAMINERS.

Theoretically the mode of cooperation between psychologist and psychiatrist was laid down in a joint memorandum signed by the chiefs of the two divisions involved (see pp. 87f.). In practice, however, a great variety of methods for securing this cooperation was developed in the camps to meet the special local requirements of temporal order of examination, spatial location of examining stations, rush requirements, and the like. The details of such methods are further described in the section on camp organizations (pp. 62–87). Typically different methods, for example, were in operation at Camps Lee, Dix, and Pike. Psychologists served with recruit examining boards in nearly all camps, and with disability boards, and in the neuropsychiatric wards of base hospitals. The fact that over 8,000 men, as the result of individual psychological examination, were recommended for special psychiatric examination and discharge indicates the magnitude of this coordinated service.

SERVICES TO PERSONNEL OFFICERS.

From the beginning of psychological examining, grades (or grades and scores) were reported to personnel officers for entry upon qualification cards. Personnel officers used these ratings for a variety of purposes, some of which are described below.

Before the trade tests were established psychological grades were used to a greater or less extent as a partial basis for occupational ratings; thus, for example, some personnel officers

made a practice of giving no rating of "expert" in the skilled trades except in connection with a psychological grade of C or better. Sometimes in filling a special requisition calling for high-grade men of a given trade, they selected only the men of that trade having the highest psychological ratings. At a later date more definite information as to the probable intelligence of various occupational groups was furnished to the Committee on Classification of Personnel by the psychologists (see pp. 819ff.). One psychologist from the division, Maj. Hayes, was assigned to the trade tests laboratory at Newark to assist in the development and standardization of trade tests.

In numerous cases, where requisitions called for the transfer to another camp of negro recruits capable of becoming noncommissioned officers or of filling other positions of special responsibility, personnel officers made their selection solely on the basis of psychological rating. Occupational qualifications were often of no significance in these cases since so large a percentage of the men were farmers. Dependence was frequently placed upon the ratings in the assignments to stevedore regiments, pioneer infantry, labor battalions and the like. Psychological ratings were commonly used by personnel adjutants and commanding officers as a check upon the appropriateness of assignments of men to development battalions. Not only were psychologists' recommendations for special assignment closely followed in most camps, but the ratings were sometimes also used to prevent too numerous assignments; thus, in several camps where organization commanders were considered overzealous in raising the standard of their organization by such transfer, orders were issued from headquarters that no man should be transferred as inapt without consideration of his psychological rating or in some cases without joint recommendation of transfer by psychologist and summary court officer.

Use of psychological grades in the balancing of mental strength of organizations has been mentioned in the account of the examining at Camp Lee in the fall of 1917 (Part II). More intensive and systematic application of this principle was made later in several camps. (See camp organization at Camps Kearny, Pike, Logan, and Cody.) The similar practice of assigning remainders from the depot brigade to special organizations such as antiaircraft and other machine gun battalions, artillery parks, and the like, after occupational needs of these organizations had been satisfied, was even more common. In several camps psychological examinations were made a final part of the special examination to determine fitness for overseas duty.

SERVICES TO JUDGE ADVOCATES.

As mentioned above, psychological ratings were sometimes consulted by company commanders in considering cases of misconduct before court-martial charges should be made. Either independently or in connection with psychiatrists many offenders were given a special psychological examination to furnish courts-martial with evidence as to the responsibility of an accused. In several camps all stockade prisoners were examined as a matter of routine. Capt. Norton and Lieuts. Folsom and Lincoln were detailed for some months to assist in a complete mental and social survey of the entire prisoner population at Fort Leavenworth Disciplinary Barracks. By order of the Secretary of War all conscientious objectors were given special psychological examination. A summary of the results of these examinations is presented elsewhere in this report (see pp. 799ff.).

SERVICES TO THE MORALE BRANCH OF THE GENERAL STAFF.

Activities of the Division of Psychology played an important part in bringing about the organization of morale work. The chief of the division used every opportunity to promote interest in recommendations submitted by Col. E. L. Munson to the Surgeon General relative to "the need for a systematic plan for the psychological stimulation of troops in promoting fighting efficiency." To this end he organized two conferences for the discussion of the problem of controlling morale, and in addition provided members of the General Staff with pertinent information.

As commanding officer of the medical officers' training camp at Fort Oglethorpe, Ga., Col. Munson later had opportunity to put his ideas into effect. Under his instructions Maj.

Foster, Capt. Frost, and Lieut. Anderson prepared plans for systematic morale work in the detention camp at Camp Greenleaf, and, with the assistance of enlisted men of the psychological service, School of Military Psychology, organized practical service for the camp. Subsequently this work was extended throughout Camp Greenleaf.

SERVICES TO THE COMMITTEE ON EDUCATION AND SPECIAL TRAINING.

Majs. Terman and Yoakum were in succession employed as psychologists by the Committee on Education and Special Training of the War Department. In October, 1918, this committee requested the cooperation of the Division of Psychology in securing mental ratings of members of the Student Army Training Corps, to serve as partial basis for their admission, educational guidance, and assignment. Permission was given for the use of the alpha examination, and arrangements were made for administering the tests under direction of faculty members and with supervision of psychological officers who should be temporarily assigned for the work until others could be commissioned. The armistice prevented the extension of testing to the 209 schools which stated their desire to use the tests. Only 11 Student Army Training Corps units have reported results fully. In 104 others, reports are either incomplete or indicate that the tests will be used later. The total number of students in the colleges who were given the test is 11,500 and includes the Students' Army Training Corps, Reserve Officers' Training Corps, and men and women in the colleges and normal schools.

SERVICE THROUGH SPECIAL EXAMINATION.

In addition to examination of the groups mentioned in the previous paragraphs, numerous special examinations have been made, usually by special request to the division. Candidates of the third officers' training camp, some 14,000 in number, were given the examination in February, 1918, by examiners detailed for the purpose from the four original camps. Examination *a* was used. Examinations of candidates at later officers' training camps were conducted by the chief psychological examiners at the camps involved. In the fourth and later series examination alpha was used. At later periods the tests served as 'assisting guides' in making final selections for commissions.

Other special examinations were made as follows: Candidates for commissions in the personnel schools at Camp Meigs and elsewhere; civilian applicants for commission in the Quartermaster Corps at Camps Bowie and Sherman and in the Intensive Service Course at Camp Meigs; officers and civilian staff of the office of the Quartermaster General at Washington; aviation candidates at Camp Jackson; the chaplains' school at Camp Taylor; the Army Nurse Corps at Camps Kearny, Lee, Logan, and Sherman; the civilian personnel of the Civil Service Commission in Washington; soldier hospital attendants at St. Elizabeth's Hospital for the Insane, Washington; mental cases at the port of debarkation at Newport News; personnel of the Field Signal Service at Camp Alfred Vail, N. J.; secretaries of the Young Men's Christian Association and of the Knights of Columbus at Camps Sherman, Taylor, Travis, and elsewhere; 191 German war prisoners at Camp Sherman, and the war prison barracks guard at Fort Oglethorpe; prostitutes in cities near Camps Dix, Greenleaf, Hancock, Newport News, Sherman, and Travis.

SERVICES THROUGH DEVELOPMENT OF SPECIAL METHODS.

At Camp Lewis practical methods were devised by psychologists to demonstrate the part played by trigger squeeze and breathing in determining accuracy and improvement in rifle practice. Complete account of the method is impossible in this place, but the following statement from the colonel of an infantry regiment who used the devices will make clear the chief points:

These devices accomplish the following:

(*a*) They demonstrate ocularly the manner in which a man aiming a rifle breathes, whether he is taking a full breath, or breathes irregularly.

(*b*) They demonstrate ocularly the manner in which a man pulls the trigger, whether by a squeeze or jerk; i. e., the manner of pulling the trigger at all stages of the aiming and releasing of the firing pin.

This possesses the following value in the instruction of the rifleman:

(*a*) It enables the instructor to see the errors in breathing and aiming at once.

(*b*) It enables the rifleman to see his own errors.

(*c*) It enables both instructor and rifleman to see when those errors have been corrected.

(*d*) From the foregoing it enables the instructor to decide when the recruit is proficient in aiming, breathing, and trigger squeezing, and prepared to pass on to instruction in firing the rifle.

(*e*) A practical test in breathing and trigger pull may be prescribed and determined by means of this device.

At Camp Upton formal tests of ability to understand and speak the English language were developed for the purpose of determining what men could not grasp (without special training in language) instruction in military drill. The tests gave measures of ability in five grades on a scale from 0 to 45 in the individual test and from 0 to 30 in the group test. The individual examination involved verbal answers to a set of questions graded in difficulty, and upon performance of directions similarly graded. In the group examination the score depended upon the following of graded directions in connection with a series of pictures. The individual examination required on the average about 5 minutes, and the group test about 10 minutes.

At Camp Sherman certain tests to assist in selection were suggested by the chief psychological examiner and made part of the qualifications of enlisted men considered for intelligence work. Beside the psychological test those adopted were suited to measure discrimination of minute movements, localization of light, and deductive reasoning.

At Camp Jackson the chief psychological examiner assisted in the standardization of educational tests used to measure progress and ability in the Field Artillery Replacement Depot. When the armistice came he was engaged, by request of the commanding general, in developing further tests for the special selection and measurement of artillerists.

MISCELLANEOUS SERVICES.

Minor services too numerous to mention were rendered by the Division to governmental and civilian agencies concerned either directly or indirectly with the war, and to industrial and educational institutions, in order that the practical values of methods of mental measurement might be widely demonstrated and the methods rapidly perfected. In return for these services the Division of Psychology received valuable assistance from many sources in accumulating data for the revision of methods and the evaluation of results.

CHAPTER 5.

PROVISION OF MATERIALS FOR PSYCHOLOGICAL EXAMINING

During the preofficial period of work on methods, printed materials and equipment for the preliminary trial of examining were manufactured. These included 200 copies of the Examiner's Guide, some 10,000 examination blanks, and such simple examining apparatus as was required by four stations. When the Army accepted psychological methods for official trial the unused balance of these materials was turned over to the War Department for use in the cantonments.

The task of designing, manufacturing, and distributing the necessary equipment for the examining of millions of soldiers was so complex and difficult that it required practically the entire time of one officer throughout the period of work. The difficulties were increased by revision of methods, the introduction of new methods, and unavoidable delays in manufacturing and distribution.

There follow in order the materials manufactured (*a*) for the instruction of examiners in the conduct of methods, (*b*) blanks for group examinations, (*c*) blanks for individual examinations, (*d*) report cards and blanks, (*e*) apparatus for group examining, (*f*) apparatus for individual examining, and, finally, (*g*) supplementary materials for staff equipment in the field.

(*a*) Examiner's Guide:

Original edition, July, 1917, Albany, N. Y., 200 copies; first revision, September 4, 1917, Washington, D. C., 500 copies (reprinted on pp. 123–153; second revision, September 1, 1918, Government Printing Office, 1,200 copies (reprinted on pp. 153–199).

(*b*) Group examination blanks:

For segregation (pp. 279–280; 347 ff.); literacy test (reprinted, pp. 279–280), September 4, 1917; 160,000 (four forms).

For literates: Group examinations *a* and *b* (reprinted, pp. 201–218); September 4, 1917; 200,000 (five forms, A to E). Group examination alpha (reprinted, pp. 219–234; January 19, 1918, 10,000 (form 5); February 11, 1918, 500,000 (forms 5 to 9); May 4, 1918, 500,000 (forms 5 to 9); June 20, 1918, 1,000,000 (forms 5 to 9); July 24, 1918, 1,000,000 (forms 5 to 9).

For illiterates: Group examination beta (reprinted, pp. 235–258); January 11, 1918, 5,000 (preliminary form); March 8, 1918, 100,000 (form 0); May 4, 1918, 125,000 (form 0); June 13, 1918, 125,000 (form 0); June 20, 1918, 300,000 (form 0); July 24, 1918, 500,000 (form 0).

(*c*) Individual examination blanks:

Individual examination, preliminary form (reprinted, pp. 260–266); September 4, 1917, 60,000.

Point Scale examination (reprinted, pp. 268–270); February 8, 1918, 20,000; May 4, 1918, 30,000; July 19, 1918, 100,000.

Stanford-Binet examination (reprinted, pp. 271–274); February 11, 1918, 20,000; May 4, 1918, 25,000; July 19, 1918, 100,000.

Performance Scale examination (reprinted, pp. 275–278); February 23, 1918, 20,000; May 4, 1918, 25,000; July 19, 1918, 100,000.

(*d*) Psychological records and reports:

Psychological record, individual cards (reprinted, pp. 286, 289); September 4, 1917, 160,000; April 4, 1918, 20,000; May 4, 1918, 1,000,000; June 20, 1918, 2,000,000; July 24, 1918, 1,500,000.

Call list for individual psychological examination (reprinted, p. 287); September 4, 1917, 6,000.

Report of psychological examination (reprinted, p. 287); September 4, 1917, 6,000; March 1, 1918, 20,000; May 4, 1918, 30,000; June 20, 1918, 50,000; July 24, 1918, 200,000.

Summary of psychological examinations (reprinted, p. 288); September 4, 1917, 1,000.

(*e*) Group examining materials:

Beta outfit (blackboard and frame), March 15, 1918, 30; May 14, 1918, 30.

(*f*) Individual examining materials:

Stanford-Binet, February 15, 1918, 500 sets; May 13, 1918, 500 sets.

Point Scale, February 15, 1918, 500 sets; May 13, 1918, 500 sets.

Ship test (Performance Scale, test 1); February 16, 1918, 200 (100 additional blocks); May 14, 1918, 200 (100 additional blocks).

Manikin (Performance Scale, test 2); February 16, 1918, 200; May 13, 1918, 200.

Feature profile (Performance Scale, test 2); February 16, 1918, 200; May 13, 1918, 200.

Cube imitation. (Performance Scale, test 3); February 16, 1918, 200; May 13, 1918, 200.

Cube construction (Performance Scale, test 4); February 16, 1918, 200; May 13, 1918, 200.

Form board (Performance Scale, test 5); February 16, 1918, 200; May 13, 1918, 200.

Picture completion (Performance Scale, test 10); February 16, 1918, 100; May 13, 1918, 300.

Picture arrangement (Performance Scale, test 9); January 23, 1918, 1,000 sets.

(*g*) Supplementary materials for each staff in the field:

Six gross lead pencils; three pencil sharpeners; two typewriters; two typewriter tables; one chest of tools.

With the development and introduction of three different methods of individual examining and of a special procedure for the group examining of illiterates it became necessary for the staff of the Division of Psychology to design and direct the manufacture of numerous items of equipment, of which the principal ones have been listed above. This work was accomplished expeditiously and at very reasonable cost through the patriotic service of various firms and with the generous assistance of Dr. Healy, who permitted the unrestricted use of his revised picture completion test. The Houghton-Mifflin Co. also permitted the manufacture for army use of the Stanford-Binet materials and the printing of a special form of record blank.

One of the principal sources of embarrassment to the division was delay in transportation. It was foreseen that materials would have to be manufactured in large quantities if shortages were to be avoided but it was also foreseen that methods would necessarily undergo radical revision which would probably render old materials useless. The staff consequently had to compromise, taking some risk of shortage together with some risk of waste.

Since they are important documents for further scientific procedures, as well as for historical purposes, both the first and the second revisions of the Examiner's Guide and all of the examination blanks and report forms are reproduced in this volume (pp. 123 to 199).

In March, 1919, the Supply Division of the Office of the Surgeon General recommended the sale of all surplus psychological materials, with the exception of certain items and quantities reserved for the use of the permanent Army. A list of these materials with their approximate cost to the Army follows:

	Cost.	Lot.		Cost.	Lot.
Group examination alpha blanks	$0.65	100	Manikin and feature profile tests	1.00	Set.
Group examination beta blanks	.65	100	Dearborn form boards	2.50	Set.
Psychological record cards	.05	100	Weighted cubes	1.25	Set.
Report of psychological examination blanks	.20	100	Cube construction sets	1.00	Set.
Performance Scale examination blanks	.50	100	Cube imitation sets	.50	Set.
Point Scale examination blanks	.50	100	Picture arrangement sets	.25	Set.
Stanford-Binet examination blanks	.50	100	Point Scale materials	.30	Set.
Beta outfits	28.50	Outfit.	Stanford-Binet materials	.70	Set.
Picture completion tests	6.00	Set.	Stenquist sets	2.00	Set.
Ship tests	1.25	Set.			

There is a general belief that the War Department paid extravagantly for its materials and service. Precisely the opposite is true in the case of psychological examining, since the printed materials and examining equipment were purchased at figures far below those usually paid by civilians, and since highly trained examiners worked in the Army on salaries which averaged considerably less than their civilian salaries.

Estimates of the cost of examining soldiers indicate that during the preliminary period of work in four National Army cantonments psychological examination cost approximately 30 cents per man. Subsequently the introduction of new methods and the growth of personnel increased the amount to approximately 50 cents. In making this estimate the cost of space for

psychological examining and the insurance or disability claims of psychological personnel have been necessarily omitted.

The two editions of the Examiner's Guide reproduced in the following pages are designated respectively as "Examiner's Guide, first revision," and "Examiner's Guide, second revision." The first of these differs from the original Examiner's Guide published in July, 1917, only in the respects indicated on p. 325.

In addition to the first and second revised editions of the complete guide, the specially prepared guide for use in the Students' Army Training Corps is also reproduced in part (pp. 200 to 201).

The examination blanks and report forms used in connection with the Examiner's Guide are reproduced on pages 202 to 292; materials and procedures are pictured in plates 5 to 21.

SECTION 1.—*Examiner's guide, first revision.*

EXAMINER'S GUIDE

FOR THE PSYCHOLOGICAL EXAMINATION OF RECRUITS.

FIRST REVISION.

[Prepared especially for military use by the Subcommittee on Methods of Examining Recruits appointed by the Psychology Committee of the National Research Council. Revised by direction of the Surgeon General of the Army and printed by the Medical Department, U. S. A., September, 1917.]

INTRODUCTORY EXPLANATIONS.

1. *Object of the tests.*—(*a*) To sift out those mental defectives who are not qualified for military service. (*b*) To discover men of superior ability for report to the commanding and company officers. These men should be considered for non-commissioned officers or for tasks of special responsibility. (*c*) To discover men with marked special skill.

2. *Plan of the work.*

(1) Literacy test: Time, 5 to 10 minutes; number, 50 to 80 men in a group.

(2) Group intelligence examination *a:* Time, 40 to 50 minutes; number, 50 to 80 men in a group.

(3) Group intelligence examination *b*, for those who react slowly in (2): Time, 40 to 50 minutes; number, any number up to 80 in a group.

(4) Group examination for skill: Time, 30 to 40 minutes; number, 10 to 25 men in a group.

(5) Individual examination, for intelligence, skill, or both: Time, 30 to 60 minutes; number, 1 at a time.

A company will ordinarily be taken in three groups of not more than 80 men each. The order of procedure is as follows:

(*a*) A group of not more than 80 men will report to the chief psychological examiner, at a room designated for examinations (1) and (2).

(*b*) The literacy test is given, after which three or four assistants collect the literacy test blanks, look them over quickly (this can be done in 5 minutes or less), and send those who have shown themselves illiterates directly to the group examination for skill. The others remain for test (2).

(*c*) Those making an unsatisfactory score in group intelligence examination *a* will report (the following afternoon if possible) in groups of not more than 80, in designated room for group intelligence examination *b*, which is a similar test with extended time.

(*d*) Individuals who have made a consistently low score in the group tests will report by appointment at individual examining rooms. It is estimated that not over 3 to 5 per cent of the men will require individual examination.

Summarizing: All men take (1), and either (2) or (4). Those who pass in (1), take (2) immediately. Those who fail in (1), go directly to (4). Those who fail in (2), take (3), failing in (3), they take (4); failing in (4), they take (5). Those who fail in (1) and (4) also take (5).

3. *Organization and routine.*—The value of the work and the amount accomplished will depend largely upon the efficient organization of routine procedure. The following are specially important:

(1) Arrangements should insure the securing of men for group or individual testing without loss of time.

(2) Test blanks should be scored as early as possible after a test is taken, so that individuals who fail may be summoned promptly for additional examination.

(3) The data for each individual should be transferred to the individual filing card at the earliest possible date after his examinations are completed.

LITERACY TEST.

This is given to all men at the time they are assembled for group intelligence examination *a*, and precedes the latter. As soon as the men are seated (group of not more than 80), supply each with a literacy test blank (blank side up) and a pencil. After the materials are distributed examiner says: "Turn over the paper. Read what it says, and do what it tells you to do. Ask no questions. You will have 3 minutes." After 3 minutes the papers are collected and quickly looked over by three or four assistants while the men remain seated. This should not require more than 3 to 5 minutes. Those who have filled the blanks and have made few or no errors in line 3 should remain seated for group intelligence examination *a*. Those who could not write or who have made many errors in lines 1 and 2 should be sent at once to the group skill tests.

Coaching is prevented by using literacy blanks A, B, C, and D in miscellaneous order.

GROUP INTELLIGENCE EXAMINATION *a*.

This is taken by all who have passed the literacy test, and immediately after the illiterates have been transferred to the group skill test.

In giving the directions, speak rather slowly, distinctly, and with proper emphasis. Expect and demand perfect order and prompt response to commands. Say: "This is an examination to assist in finding out what you are best

fitted to do in the Army (Navy). I'm going to pass around some papers now. Don't turn the pages until I tell you to." Have the papers distributed.

When all the men are supplied, say: "In the Army (Navy) you often have to listen to commands and then carry them out exactly. I am going to give you some commands to see how exactly *you* can carry them out. Listen closely. Do what I tell you to do as carefully and quickly as you can. Some of the things will be very easy for you. Some you may find hard. Ask no questions. Attend strictly to business. Don't watch any other man to see what *he* does.

"Now, on the page before you, write your name after the word 'Name.' Write your first name first, then your middle initial, if any, and your last name. Take time to write *very plainly*."

After name has been written say: "Put your age in years after the word 'Age.'

"In the next line write your company, battalion, regiment, and division.

"In the next line write the name of the country in which you were born. If you were not born in the United States tell next the number of years you have lived in this country. After 'Race,' write the word 'White.' (In examining negro troops substitute the word 'Negro.')

"In the next line, after 'Occupation,' write your usual work, trade or business (such as carpenter, grocery clerk, laborer, farmer, student).

"Next put down how much you earned a week before you entered the Army (Navy).

"After 'Schooling' draw a line under the highest grade or school you attended. For example, if the highest grade you attended was the fifth grade, draw a line under grade 5; if you finished the second year in the high school or preparatory school, draw a line under high school, year 2, etc. (Explain further if necessary.)

"Look at your papers. Just below where you have been writing there are several sets of forms—squares, circles, and so forth. First you will be told to do something with the squares at 1, afterwards with the circles at 2, and so on.

"When I call 'attention,' stop instantly whatever you are doing and hold your pencil up, with your elbow on the table—so. Don't put your pencil down to the paper until I say 'go.' (Examiner lowers his pencil.) Listen carefully to what I say. Do just what you are told to do. Ask no questions. As soon as you are through, pencils up. Remember, wait for the word 'Go.' "

N. B.—Examiner: Give the following directions very distinctly and at moderate speed. After giving the command "Attention," the examiner should always notice carefully whether all pencils are up and never proceed until they are. This is especially important in the beginning. Be careful not to pause or to drop the voice in the course of the compound direction—e. g., in 2, before the words "and also." Raise your pencil whenever you say "Attention." Lower it promptly whenever you say "Go." Be careful to use the directions for test 1 that fit the form of record blank distributed.

Test 1, form A.

1. "Attention! 'Attention' always means 'Pencils up!' Look at 1. When I say 'Go' (but not before), make a cross in the largest square—GO!" (Allow not over 3 seconds.)

2. "Attention! Look at 2. When I say 'Go' make a cross in the first circle and also a figure 1 in the third circle—GO!" (Allow not over 5 seconds.)

3. "Attention! Look at 3. When I say 'Go' draw a line from circle 1 to circle 4 that will pass *above* circle 2 and *below* circle 3—GO!" (Allow not over 5 seconds.)

4. "Attention! Look at the square and triangle at 4. When I say 'Go' make a cross in the space which is in the triangle but not in the square, and also make a figure 1 in the space which is in the triangle and in the square—GO!" (Allow not over 10 seconds.)

5. "Attention! Look at 5. When I say 'Go' make a figure 1 in the space which is in the circle but not in the triangle or square, and also make a figure 2 in the space which is in the triangle and circle but not in the square—GO!" (Allow not over 10 seconds.)

6. "Attention! Look at 6. When I say 'Go' cross out each number that is more than 20 but less than 30—GO!" (Allow not over 15 seconds.)

7. "Attention! Look at 7. Notice the three circles and the three words. When I say 'Go' make in the *first* circle the *first* letter of the *first* word; in the *second* circle the *first* letter of the *second*; word, and in the *third* circle the *last* letter of the *third* word—GO!" (Allow not over 10 seconds.)

8. "Attention! Look at 8. When I say 'Go' put in the second circle the right answer to the question, 'How many months has a year?' In the third circle do nothing, but in the fourth circle put any number that is a wrong answer to the question that you just answered correctly—GO!" (Allow not over 10 seconds.)

(*N. B.*—Examiner: In reading 9 don't pause at the word circle as if ending a sentence.)

9. "Attention! Look at 9. If a machine gun can shoot more bullets a minute than a rifle, then (when I say 'Go') put a cross in the second circle; if not, draw a line *under* the word NO—GO!" (Allow not over 10 seconds.)

10. "Attention! Look at 10. When I say 'Go' *cross out* the letter just before C and also draw a line *under* the second letter before H—GO!" (Allow not over 10 seconds.)

"During the rest of this examination don't turn any page forward or backward unless you are told to. Now turn over the page to test 2."

Test 1, form B.

1. "Attention! 'Attention' always means 'Pencils up!' Look at 1. When I say 'Go' (but not before) make a cross in the smallest square—GO!" (Allow not over 3 seconds.)

2. "Attention! Look at 2. When I say 'Go' make a cross in the second circle and also a figure 1 in the third circle—GO!" (Allow not over 5 seconds.)

3. "Attention! Look at 3. When I say 'Go' draw a line from circle 2 to circle 5 that will pass *above* circle 3 and *below* circle 4—GO!" (Allow not over 5 seconds.)

4. "Attention! Look at the square and triangle at 4. When I say 'Go' make a cross in the space which is in the square but not in the triangle, and also make a figure 1 in the space which is in the triangle and in the square—GO!" (Allow not over 10 seconds.)

5. "Attention! Look at 5. When I say 'Go' make a figure 1 in the space which is in the triangle but not in the circle or square, and also make a figure 2 in the space which is in the square and circle but not in the triangle—GO!" (Allow not over 10 seconds.)

6. "Attention! Look at 6. When I say 'Go' cross out each number that is more than 30 but less than 40—GO!" (Allow not over 15 seconds.)

7. "Attention! Look at 7. Notice the three circles and the three words. When I say 'Go' make in the *first* circle the *last* letter of the *first* word; in the *second* circle the *last* letter of the *second* word; and in the *third* circle the *third* letter of the *third* word—GO!" (Allow not over 10 seconds.)

8. "Attention! Look at 8. When I say 'Go' put in the second circle the right answer to the question, 'How many months has a year?' In the fourth circle do nothing, but in the fifth circle put any number that is a wrong answer to the question that you just answered correctly—GO!" (Allow not over 10 seconds.)

(*N. B.*—Examiner: In reading 9 don't pause at the word circle as if ending a sentence.)

9. "Attention! Look at 9. If a regiment is bigger than a company, then (when I say 'Go') put a cross in the first circle; if not, draw a line *under* the word NO—GO!" (Allow not over 10 seconds.)

10. "Attention! Look at 10. When I say 'Go' *cross out* the letter just before D and also draw a line *under* the second letter before I—GO!" (Allow not over 10 seconds.)

"During the rest of this examination don't turn any page forward or backward unless you are told to. Now turn over the page to test 2."

Test 1, form C.

1. "Attention! 'Attention' always means 'Pencils up!' Look at 1. When I say 'Go' (but not before) make a cross in the first square—GO!" (Allow not over 3 seconds.)

2. "Attention! Look at 2. When I say 'Go' make a figure 1 in the first circle and also a cross in the third circle—GO!" (Allow not over 5 seconds.)

3. "Attention! Look at 3. When I say 'Go' draw a line from circle 3 to circle 6 that will pass *above* circle 4 and *below* circle 5—GO!" (Allow not over 5 seconds.)

4. "Attention! Look at the square and triangle at 4. When I say 'Go' make a figure 1 in the space which is in the triangle but not in the square, and also make a cross in the space which is in the triangle and in the square—GO!" (Allow not over 10 seconds.)

5. "Attention! Look at 5. When I say 'Go' make a figure 1 in the space which is in the square and not in the circle or triangle, and also make a figure 2 in the space which is in the circle and triangle but not in the square—GO!" (Allow not over 10 seconds.)

6. "Attention! Look at 6. When I say 'Go' cross out each number that is more than 40 but less than 50—GO!" (Allow not over 15 seconds.)

7. "Attention! Look at 7. Notice the three circles and the three words. When I say 'Go' make in the *first* circle the *first* letter of the *first* word; in the *second* circle the *second* letter of the *second* word; and in the *third* circle the *last* letter of the *last* word—GO!" (Allow not over 10 seconds.)

8. "Attention! Look at 8. When I say 'Go' put in the first circle the right answer to the question, 'How many months has a year?' In the third circle do nothing, but in the fourth circle put any number that is a wrong answer to the question that you just answered correctly—GO!" (Allow not over 10 seconds.)

(N. B.—Examiner: In reading 9 don't pause at the word circle as if ending a sentence.)

9. "Attention! Look at 9. If a battleship is larger than a submarine, then (when I say 'Go') put a cross in the third circle; if not, draw a line *under* the word NO—GO!" (Allow not over 10 seconds.)

10. "Attention! Look at 10. When I say 'Go' *cross out* the letter just before E and also draw a line *under* the second letter before H—GO!" (Allow not over 10 seconds.)

"During the rest of this examination don't turn any page forward or backward unless you are told to. Now turn over the page to test 2."

Test 1, form D.

1. "Attention! 'Attention!' always means 'Pencils up!' Look at 1. When I say 'Go' (but not before) make a cross in the last square—GO!" (Allow not over 3 seconds.)

2. "Attention! Look at 2. When I say 'Go' make a figure 2 in the second circle and also a cross in the third circle—GO!" (Allow not over 5 seconds.)

3. "Attention! Look at 3. When I say 'Go' draw a line from circle 1 to circle 4 that will pass *below* circle 2 and *above* circle 3—GO!" (Allow not over 5 seconds.)

4. "Attention! Look at the square and triangle at 4. When I say 'Go' make a figure 1 in the space which is in the square but not in the triangle, and also make a cross in the space which is in the triangle and in the square—GO!" (Allow not over 10 seconds.)

5. "Attention! Look at 5. When I say 'Go' make a figure 2 in the space which is in the circle but not in the triangle or the square, and also make a figure 3 in the space which is in the triangle and circle but not in the square—GO!" (Allow not over 10 seconds.)

6. "Attention! Look at 6. When I say 'Go' cross out each number that is more than 50 but less than 60—GO!" (Allow not over 15 seconds.)

7. "Attention! Look at 7. Notice the three circles and the three words. When I say 'Go' make in the *first* circle the *last* letter of the *first* word; in the *second* circle the *middle* letter of the *second* word; and in the *third* circle the *first* letter of the *third* word—GO!" (Allow not over 10 seconds.)

8. "Attention! Look at 8. When I say 'Go' put in the first circle the right answer to the question, 'How many months has a year?' In the second circle do nothing, but in the fifth circle put any number that is a wrong answer to the question that you just answered correctly—GO!" (Allow not over 10 seconds.)

(*N. B.*—Examiner: In reading 9 don't pause at the word circle as if ending a sentence.)

9. "Attention! Look at 9. If taps sound in the evening, then (when I say 'Go') put a cross in the first circle; if not, draw a line *under* the word NO—GO!" (Allow not over 10 seconds.)

10. "Attention! Look at 10. When I say 'Go' *cross out* the letter just after F and also draw a line *under* the second letter after I—GO!" (Allow not over 10 seconds.)

"During the rest of this examination don't turn any page forward or backward unless you are told to. Now turn over the page to test 2."

Test 1, form E.

1. "Attention! 'Attention!' always means 'Pencils up!' Look at 1. When I say 'Go' (but not before) make a cross in the second square—GO!" (Allow not over 3 seconds.)

2. "Attention! Look at 2. When I say 'Go' make a cross in the first circle and also a figure 1 in the last circle—GO!" (Allow not over 5 seconds.)

3. "Attention! Look at 3. When I say 'Go' draw a line from circle 2 to circle 5 that will pass *below* circle 3 and *above* circle 4—GO!" (Allow not over 5 seconds.)

4. "Attention! Look at the square and triangle at 4. When I say 'Go' make a figure 2 in the space which is in the triangle but not in the square, and also make a figure 3 in the space which is in the square and in the triangle—GO!" (Allow not over 10 seconds.)

5. "Attention! Look at 5. When I say 'Go' make a figure 2 in the space which is in the triangle but not in the circle or square, and also make a figure 3 in the space which is in the square and circle but not in the triangle—GO!" (Allow not over 10 seconds.)

6. "Attention! Look at 6. When I say 'Go' cross out each number that is more than 60 but less than 70—GO!" (Allow not over 15 seconds.)

7. "Attention! Look at 7. Notice the three circles and the three words. When I say 'Go' make in the *first* circle the *third* letter of the *first* word; in the *second* circle the *first* letter of the *second* word; and in the *third* circle the *first* letter of the *third* word—GO!" (Allow not over 10 seconds.)

8. "Attention! Look at 8. When I say 'Go' put in the third circle the right answer to the question, 'How many months has a year?' In the fourth circle do nothing, but in the fifth circle put any number that is a wrong answer to the question that you just answered correctly—GO!" (Allow not over 10 seconds.)

(*N. B.*—Examiner: In reading 9 don't pause at the word circle as if ending a sentence.)

9. "Attention! Look at 9. If a captain is superior to a corporal, then (when I say 'Go') put a cross in the second circle; if not, draw a line *under* the word NO—GO!" (Allow not over 10 seconds.)

10. "Attention! Look at 10. When I say 'Go' *cross out* the letter just after G and also draw a line *under* the second letter after H—GO!" (Allow not over 10 seconds.)

"During this rest of this examination don't turn any page forward or backward unless you are told to. Now turn over the page to test 2."

Test 2, memory span.

N. B. Examiner. Read the numbers (next page) in this test very distinctly at the rate of 1 digit per second, taking special care to avoid grouping or accenting. Allow not over 10 seconds for writing 4, 5, and 6 digit numbers. Allow not over 15 seconds for writing 7, 8, and 9 digit numbers. Proceed with the numbers of form A (or B, etc.) giving the two 3-digit numbers, the two 4-digit numbers, the two 5-digit numbers, and so on through the two 9-digit numbers. Announce before each set the number of digits and the number of the set. Thus, begin by saying:

"Attention! Look at the directions while I read them. 'This is a test to see how many figures you can remember and write down *after* they are spoken. In the first row of *empty* squares write the first set of figures you hear, as shown in the samples; in the second row write the second set you hear, and so on.'

"In this test I shall not say 'Go,' but you are to keep your pencils raised until after I have read the whole set of figures."

"Attention!" (Hold up the hand as an example.) "Keep pencils up until I am through reading. Three figures, first set, 1 3 5." (Drop hand. Allow not over 10 seconds.)

"Attention!" (Be sure that every pencil is up.) "Three figures, second set, 6 4 1." (Drop hand. Allow not over 10 seconds.)

"Attention! Four figures, first set," and so on. (Be sure to begin in the correct column.)

"Turn over the page to test 3."

Materials for group test 2, memory span and individual test D, digits backward.

		A.	B.	C.	D.	E.
Not over 10 seconds.	4 figures, first set	2 8 6 1	3 9 4 7	2 6 3 9	2 8 5 3	4 1 6 2
	4 figures, second set	5 3 9 4	5 1 8 3	3 7 2 5	9 6 1 7	7 5 8 4
	5 figures, first set	7 4 2 9 6	5 1 4 8 6	3 8 4 2 5	3 9 2 6 1	5 8 4 7 3
	5 figures, second set	8 5 1 6 4	1 6 9 4 7	8 3 7 5 9	4 7 1 8 6	4 7 5 2 8
	6 figures, first set	7 2 9 5 3 6	4 7 3 6 2 9	6 3 9 1 5 8	7 3 9 4 8 1	9 5 3 8 6 2
	6 figures, second set	8 4 2 7 5 1	1 6 2 8 4 7	5 8 4 9 3 1	4 8 1 6 3 7	4 9 7 3 6 1
Not over 15 seconds.	7 figures, first set	7 4 8 2 5 9 1	9 4 1 5 8 2 7	6 2 7 1 9 5 3	5 4 9 2 7 3 6	6 1 5 3 8 2 7
	7 figures, second set	8 3 9 6 1 5 2	8 3 6 4 1 7 2	7 1 6 3 8 5 9	2 5 1 9 4 7 3	3 6 2 5 9 1 8
	8 figures, first set	2 6 9 5 8 3 7 1	4 1 6 3 9 5 8 2	9 4 2 7 1 5 8 6	2 7 1 5 3 9 6 4	3 8 5 9 2 7 1 6
	8 figures, second set	3 7 2 9 4 1 5 8	2 8 3 6 4 9 1 7	6 9 7 3 8 4 1 5	3 8 5 9 4 7 1 6	1 9 4 8 6 2 5 3
	9 figures, first set	5 9 4 8 2 7 3 1 6	9 6 4 8 3 7 2 5 1	5 1 6 9 4 2 7 3 8	9 1 6 4 8 3 7 5 2	6 9 2 5 3 7 1 8 4
	9 figures, second set	4 2 9 3 8 6 1 7 5	1 5 8 4 2 6 9 3 7	3 8 2 5 1 6 9 7 4	5 2 7 1 8 4 9 3 6	1 8 5 9 3 7 4 2 6

Test 3, disarranged sentences.

"Attention!" (Hold the hand up.) "Look at the directions at the top of the page while I read them." (Examiner reads slowly.)

"The words *morning the rises every sun* in that order don't make a sentence; but they would make a sentence if put in the right order, *the sun rises every morning*, and this statement is true.

"Again, the words *animal a is the rare dog* would make a sentence if put in the order, *the dog is a rare animal*, but this statement is false.

"Below are 20 mixed-up sentences. Some of them are true and some are false. When I say 'Go,' take these sentences one at a time. Decide what each sentence *would* say if the words were straightened out, but don't write them yourself. Then, if what it *would* say is true, draw a line under the word 'true'; if what it would say is false, draw a line under the word 'false.' If you can not be sure, guess. The two samples are already marked as they should be. Begin with No. 1 and work right down the page until time is called.—Ready—GO!"

After 2 minutes say "STOP!" Turn over the page to test 4."

Test 4, arithmetical problems.

"Attention! Look at the directions at the top of the page while I read them. 'Get the answers to these examples as quickly as you can. Use the side of this page to figure on if you need to.' I will say 'Stop' at the end of 5 minutes. You are not expected to finish all of them but to do as many as you can in the time allowed. The two samples are already answered correctly.—Ready—GO!"

After 5 minutes say "STOP! Turn over the page to test 5."

Test 5, information.

"Attention! Look at the directions at the top of the page while I read them." (Examiner reads slowly.)

"Notice the sample sentence: *People hear with the—eyes—ears—nose—mouth.* The correct word is *ears*, because it makes the truest sentence. In each of the sentences below you have four choices for the last word. Only one of them is correct. In each sentence draw a line under the one of these four words which makes the truest sentence. If you can not be sure, guess. The two samples are already marked as they should be.—Ready—GO!"

After 3 minutes say "STOP! Turn over the page to test 6. Now you have to turn your books around, this way." (Examiner illustrates the necessary rotation.)

Test 6, synonym-antonym.

"Attention! Look at the directions at the top of the page while I read them." (Examiner reads slowly.)

"If the two words of a pair mean the same or nearly the same, draw a line under *same*. If they mean the opposite, or nearly the opposite, draw a line under *opposite*. If you can not be sure, guess. The two samples are already marked as they should be.—Ready—GO!"

After 1½ minutes say "STOP! Turn over the page to test 7."

Test 7, practical judgment.

"Attention! Look at the directions while I read them.

"This is a test of common-sense. Below are 10 questions. Four answers are given to each question. You are to look at the answers carefully; then make a cross in the square before the best answer to each question, as in the sample at the top of the page:

"Why do we use stoves? Because—

☐ they look well
☐ they are black
☒ they keep us warm
☐ they are made of iron

"Here the third answer is the best one and is marked with a cross.

"Begin with No. 1 and keep on until time is called.—Ready—GO!"

After 1 minute say "STOP! Turn over the page to test 8."

Test 8, number series completion.

(*N. B.* Examiner. Give these instructions very slowly.)

"Attention! Look at the directions at the top of the page while I read them." (Examiner reads slowly.)

"In the lines below, each number is gotten in a certain way from the numbers coming before it. Study out what this way is in each line and then write in the space left for it the number that should come next. The first two lines are already filled in as they should be.

"Look at the first sample—2, 4, 6, 8, 10. Each number is formed by adding 2 to the number before it, so the number after 10, on the dotted line, must be 12.

"Look at the second sample—11, 12, 14, 15, 17. Here you do not add the same number each time, but you add first, one, then two; then one, then two; and so on; so, to carry out that plan, the number after 17, on the dotted line, must be 18.

"Sometimes you need to add, sometimes to subtract.—Ready—GO!"

After 2 minutes say "STOP! Turn over the page to test 9."

Test 9, analogies.

"Attention! Notice the words in the first sample at the top of the page:

Sky—blue : grass, then in parenthesis, grow, green, cut, dead.

"*Sky* stands in the same relation to *blue* that *grass* does to one of the four words that follow it in parenthesis; that word is *green*, because grass is green, just as sky is blue.

"Again, notice the second sample:

"Fish—swims : man, then in parenthesis, boy, woman, walks, girl.

"Here the right word is *walks*. A fish swims and a man walks.

"Nw notice the third sample:

"Day—night : white, then in parenthesis, red, black, clear, pure.

"Here the right word is *black*. Night is the opposite of day and black is the opposite of white.

"In each of the lines below the first two words have a certain relation. Notice that relation and draw a line under the *one* word in the parenthesis which has that particular relation to the third word. Begin with No. 1 and mark as many sets as you can before time is called.—Ready—GO!"

After 3 minutes say "STOP! Turn over the page to test 10."

Test 10, number comparison.

"Attention! Look at the directions at the top of the page while I read them." (Examiner reads slowly.)

"Draw a line under the largest number and also under the smallest number in every column on the page."

"Notice the samples. In the first sample column you see that 87 and 19 are underlined. Eighty-seven is the largest number and 19 is the smallest number in that column. In the second sample column, 23 and 98 are underlined; these are the smallest and the largest numbers in that column. In the same way draw a line under the largest number and also under the smallest number in every column on the page.—Ready—GO!"

After 2 minutes say, "STOP! Turn over to page 1 again. In the upper right-hand corner where it says 'Group No. ——,' put the number 101 (or 102, 103, etc., according to the number of this group in the examiner's series or groups)."

Have the examination records and pencils collected *immediately* and before the men are allowed to leave their seats.

GROUP INTELLIGENCE EXAMINATION *b*.

Nature and purpose.—This examination utilizes tests 3–9 of group examination *a*, but with considerably increased time. Its purpose is to give to those who have made a low score in group examination *a*, a more favorable chance to show what they can do. The proportion taking it may range from 10 per cent to 40 per cent of those who have taken group examination *a*. Groups as large as 80 may be tested at once. Ordinarily it will be possible to test in a single

group all those of a company who have passed the literacy test, but have failed to earn a satisfactory score on group examination *a*. The same kind of blank is used as for group intelligence examination *a*, but with no attention to the form that was used in the previous test (whether A, B, C, D, or E.)

Procedure.—After the subjects are seated and supplied with test blanks and pencils, Examiner says, "At the top of page 1 write your name and age, and fill out the other blanks just as you did before." After ample time has been allowed for filling the blanks Examiner says, "This examination is much like the one you have already had, except that you will be given more time. This time we will not take test 1 or test 2. Turn over the page to test 3. (Examiner and assistant see that all subjects have turned to test 3.) If you have forgotten how to do this test, read the directions at the top of the page. Ready—GO!"

After 5 minutes Examiner says, "Turn over the page to test 4. If you have forgotten how to do this test, read the directions at the top of the page." And so on for the other tests. The time schedule for the several tests is as follows:

	Minutes.
Test 3. Disarranged sentences	5
Test 4. Arithmetical reasoning	10
Test 5. Information	6
Test 6. Synonyms, antonyms	3
Test 7. Practical judgment	3
Test 8. Number series	6
Test 9. Analogies	6

Examiner takes care to have all the subjects proceed from test to test simultaneously, saying each time: "I you have forgotten how to do this test read the directions at the top of the page."

GROUP SKILL TEST.

Nature and purpose.—This is a group test of mechanical skill. It is to be given to the following individuals: (1 All who have failed to pass the literacy test; (2) all who have failed to make a satisfactory score in group examination *b*. *Its purpose is to reduce the number of subjects who will have to be given the individual tests.

Materials (for 24 subjects).—24 sets Stenquist construction test, single series 1; 1 sample set with which to demonstrate; individual examination blank for each subject.

Directions.—Time allowed, 30 minutes.

1. Arrange boxes on tables far enough apart to discourage imitation and to give plenty of room for individual work. Where one room is used for this test alone, boxes may be left in position during the entire day's work. Be sure that boxes are placed so that the cover opens toward subject. No talking should be allowed. Subjects will often inquire about missing or extra parts, even when none are missing or extra. However, each set should be carefully inspected each time it is corrected.

2. When all subjects are seated, pass out the individual examination blanks and have the heading filled out at once. If subject can not write it is filled out for him. Examiner says: "Keep the blank and put it inside the box when you are through. *Do not open* the box until I tell you to."

3. Examiner now takes his sample box, opens it before the class (with the cover toward himself) and says: "In each one of these boxes there are some common mechanical things that have all been taken apart." (Examiner here takes out the parts of the bell, places them in the tray, showing that it has been dissembled.) "You are to take the parts and put them together as they ought to be; that is, you are to take the parts and put them together so that each thing will work perfectly.

"*Do not* watch what anyone else does, but work absolutely by yourself. See that the hinges of the box are toward you; when opened in this position the cover forms a tray in which to work." (Examiner here illustrates by appropriate gestures the way he is holding his box, with cover toward himself.)

"*Do not break the parts.* Everything goes together easily if you do it in the right way. Begin with model A; then take B; then C; and so on (examiner points to A, B, C, etc., while explaining). Put each thing back in its proper place when you finish it. If you come to one that you can not do in about 3 minutes, go on to the next. The person who gets the most things right gets the highest score. Ready—GO!"

4. Examiner must be watchful to see that all begin with model A, and that the completed models are returned to their proper places. When the test is completed, make sure that the record blank is inclosed. If any subject finishes the test before the time is up, examiner steps over to him and records on subject's blank the number of minutes taken, and closes the box.

Scoring.—On opening the box examiner takes the inclosed record blank and scores as follows under F: Inspect model A, and record its score value under A on the blank; then inspect model B, and record its score value under B, etc. When examiner has recorded all the score values he goes to the next box, leaving his assistants (two) to take each model apart, while examiner records the scores for the next box, and so on. (The scoring can be done with great speed after a little practice. If necessary it is almost always possible to secure volunteer assistants from among the subjects who have just been tested. Being already familiar with the models, they can be trained in a few minutes properly to assemble

*The number who should go from group examination *b* to the skill test can not be stated, but it should be very small. Probably not more than 3 to 5 per cent of those who *pass* the literacy test will need to take the skill test.

them. Examiner should appoint one as inspector to *make sure that every model is dissembled, and all the parts in perfect order* before re-stacking the boxes. One examiner and two assistants can with practice score 25 boxes in 30 minutes.)

Score values.—The score value to be given for each degree of performance is shown in the cuts. Occasionally some model will be so assembled that it conforms to none of the values given; give the score value nearest the same. The various score values are quickly memorized. In those cases in which subject finishes before the time is up, add one-quarter point for each gain-minute—i. e., for each minute of the standard 30 minutes that remains after he has finished. In adding up the final score avoid fractions by taking the nearest whole number.

Following is a sample score properly filled out:

Stenquist construction score.

Model	A	B	C	D	E	F	G	H	I	J	Total
Score	10	10	9	10	10	9	0	8	10	5	81
Time, 25 min.				Credit for time							1
				Total score							82

The above score means that subject finished the test in 25 minutes; 5/4 is added to the total 81; the total score is recorded as 82. In the majority of cases subject does not finish before the time is up and no entry is made under "Time."

See page 146 for score values of various types of performance.

INDIVIDUAL EXAMINATION.

It is assumed that the group examinations will have indicated for certain men the need or desirability of individual examination.

Time permitting, three groups, as classified by the group examinations, should be further examined by the individual method. These are (1) the lowest 3 to 5 per cent; (2) some of the highest; (3) certain of the irregular or atypical individuals.

The tests which are suggested for use in individual examinations are not arranged as a single scale. They may be used singly or in groups according to need.

If the subject has been examined by the group method, the result should indicate to the examiner lines of special inquiry in the individual examination.

For illiterates or those who have difficulties with English, tests A to G, designated as group I, are specially recommended.

For those who because of poor records in the group examinations or for other reasons are suspected of being intellectually subnormal, tests K to P and in addition I and J, which together constitute group II, or tests Q to V, and in addition I and J (group III) are recommended.

Subjects who because of peculiarities of behavior within or without the examining room are suspected of being psychotic may best be examined by the use of tests D, E, G, J, R, S, and T. Irregularities or inequalities of performance are significant in these and other tests.

For the further examining of men who rank very high in the group examinations or who for other reasons are thought to be supernormal, tests A, C, E, I, J, K, and P are especially suitable.

Summary.

Illiterate and foreign: Tests A, B, C, D, E, F, G, with such supplementation as proves desirable. (Group I.)
Intellectually subnormal: Tests K, L, M, N, O, P, I, J (Group II), or Tests Q, R, S, T, U, V, I, J (Group III).
Psychotic: Tests D, E, G, H, J, R, S.
Intellectually supernormal: Tests A, C, E, I, J, K, P.

The danger of "coaching" has been provided for in such tests as required it, by the preparation of several comparable "series" of materials. Usually there are five "series."

The examiner should choose for a given subject the "series" which is to be used (for example, series 3) and should record the series number in the space provided after name of test on record blank. So far as feasible, tests of the same series number should be used throughout an individual examination.

N. B.—Time is to be scored throughout in seconds.

Examiners' Directions for Individual Examination.

Test A, cube construction.

Materials.—(1) a block of wood (model 1), 1 by 3 by 3 inches, painted a dark red on the four edges, not on the upper and lower surfaces, and cut to a depth of 2 mm. so that it closely resembles a composite of 9 small cubes; (2) a block (model 2) like the one described under (1), except that in addition to the four edges one of the remaining surfaces is painted; (3) a 2-inch cube (model 3) unpainted and cut on the four surfaces so that it looks like a composite of 8 small cubes; (4) a 3-inch cube (model 4), unpainted, and so cut on the surfaces that it looks like a composite of 27 small cubes; (5) the cubes (1 inch) necessary for the construction of counterparts of the several models; (6) a wooden box 2 inches deep, 8 inches wide and 13 inches long, divided by wooden partitions into eight equal compartments.

Directions.—(*a*) Present model 1 (in each case turn the model over and call attention to the top, bottom, and sides as painted or unpainted) and the nine cubes with which its counterpart may be constructed, and say, "Put these blocks together as quickly as you can, so they will look just like this (point to model 1). Ready—GO!" Discontinue the test if subject fails on two successive parts.

Scoring.—With a stop-watch examiner measures in seconds the time required for the correct arranging of the cubes. He also counts the number of separate moves or acts (the minimum number is 9). Every time a block is put on the table or is placed in some position should be counted as a move. If subject stops work before all the cubes are in their proper places, or before the time is up, he should be urged to continue; but time should be taken and errors counted when subject puts last block in place. Each misplaced block, at the end, is counted as three moves. The presence or absence of a definite plan of work is to be recorded.

Time for work, 2 minutes.

(*b*) In the same way present model 2 and the cubes necessary to construct its counterpart, saying to subject, "Arrange these blocks as quickly as you can so they will look just like this (point to model 2). Ready—GO!"

Scoring.—Same as for (*a*).

Time for work, 2 minutes.

(*c*) Present model 3 and the eight cubes painted on three sides and say to subject, "Now fit the blocks together so they will look just like this (point to model 3). Ready—GO!"

Scoring.—Same as for (*a*).

Time for work, 2 minutes.

(*d*) Present model 4 and the cubes from which its counterpart may be constructed. The 1-inch cubes should be classified according to the number of sides painted and arranged in four adjacent compartments of box (6) so that subject may locate immediately any desired variety of cube. Examiner says to subject, "I want you to fit the blocks together so they will look just like this (take up model 5 and turn it over). You see it is not painted anywhere. You will find here (pointing to appropriate compartment of box) the unpainted block; here the ones painted on only one side, and so on). Do not take out any block till you are ready to use it. Ready—GO!"

Scoring.—Same as for (*a*). If subject gives up before time is called, each misplaced block is to be counted as three moves.

Time for work, 5 minutes.

(*e*) Present the 27 cubes again, properly distributed in the compartments of box (6), saying, "Now, fit the blocks together so that the whole of the outside (point to model 4) will be painted. Ready—GO!"

Scoring.—Same as for (*d*).

Time for work, 5 minutes.

N. B.—Examiners will ordinarily find it uneconomical of time to give more than parts (*a*), (*b*), and (*e*).

In scoring each part, the degree of planning should be scored: A (very good); B (fair); C (very poor).

Test B, clock test.

Materials.—(1) Alarm clock; (2) settings of clock.

Directions.—Examiner selects from the five series of settings presented below one for use with a given subject. He then proceeds with the test as follows:

Settings of clock.

	SERIES.									
	1		2		3		4		5	
(*a*).....	6:18	.....	3:11	.....	10:34	.....	11:04	.....	4:02	.....
(*b*).....	6:18	3:32	3:11	2:16	10:34	6:53	11:04	12:55	4:02	12:20
(*c*).....	2:36	7:13	8:13	2:41	4:57	11:25	5:32	6:28	5:47	9:29
(*d*).....	9:18	3:45	1:26	5:07	9:39	7:48	8:08	1:41	6:08	1:31
(*e*).....	6:07	1:30	5:37	7:28	2:41	8:13	6:43	8:34	4:07	1:21

(*a*) With clock set as indicated in (*a*) first trial (series 1, for example) examiner says to subject, "What time is it?" A second trial is given with the additional setting under (*a*).

Scoring.—Response, followed by a + or a − sign to indicate correctness or incorrectness.

(*b*) With clock properly set and *placed before* subject, examiner says, "What time would it be if the two hands of the clock were to trade places, so that the large hand takes the place where the small one is and the small one takes the place where the large one is."

Scoring.—Response. Consider correct (+) if error does not exceed 3 minutes.

Time limit, 1 minute. Record time in seconds for (*c*), (*d*), and (*e*).

(*c*) Same as (*b*), except that clock face is not visible to subject.

(*d*) Same as (*c*).

(*e*) Same as (*d*).

Test C, cube imitation (Knox).

Materials.—(1) Four one-inch hardwood cubes fastened securely to a wooden base 1 inch wide by ¼ inch thick by 12 inches long. The end cubes are 1 inch from the end of the base. The distance between the cubes is 2 inches. Both cubes and base are painted a dark red. The cubes are numbered, 1 to 4, from right to left. (2) A fifth cube of the same size unattached and similarly painted. (3) Ten imitation problems (*a* to *j*), as printed on record sheet.

Directions.—Examiner places the cube board before subject at a convenient distance from him and at right angles to his line of vision, with the numbered side of the cubes directed away from him and says, "Watch carefully and then

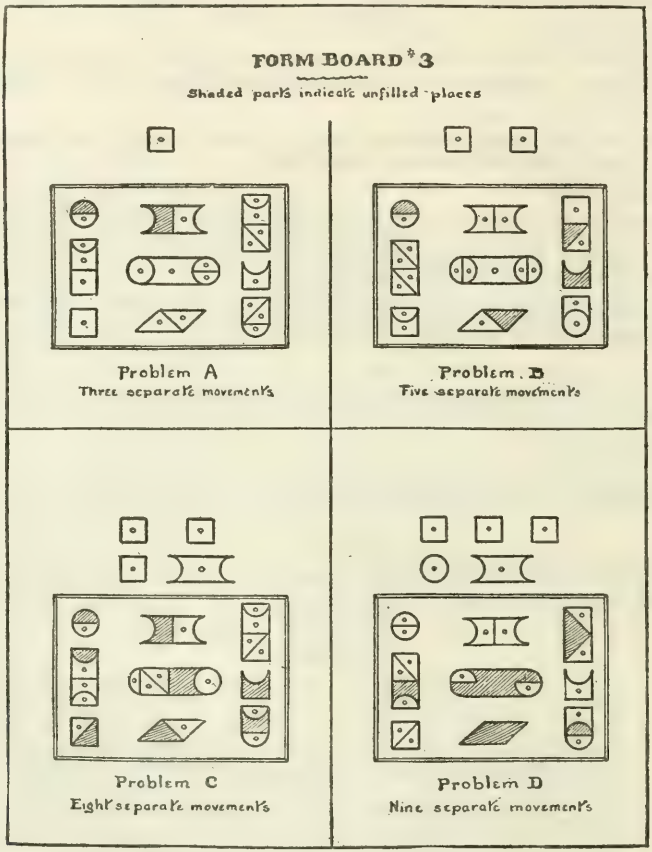


Fig. A.—Form board (Test E) with pieces arranged in various problems for subject to replace.

do just what I do." Examiner next with the fifth cube taps the attached cubes in a predetermined order, as for example in (*a*) 1, 2, 3, 4, at the rate of one per second. He now lays the tapping cube down before subject *midway between the second and the third cubes*, but nearer to subject than to the cube board and says, "Do that." Before giving the second trial, examiner says, "I am going to repeat each one."

Give a second trial whether or not the first trial is correct.

Scoring.—Record the response as right (+) or wrong (−), using a screen to prevent subject from seeing the score which examiner records.

(*b-j*) Similarly give parts (*b*) to (*j*) in order unless subject fails in five successive parts. In that event discontinue the test.

Test D, maze (Porteus).

Materials.—Four mazes, after Porteus, with slight modifications, printed on a separate four-page record sheet. On page 1 appears the maze for 10 years (maze 10); on page 2 that for 11 years (maze 11), and so on.

Directions.—Present to subject maze 10, saying, "With your pencil start at S and mark the shortest way out, as quickly as you can. Do not cross any lines and do not turn back unless you have to. Ready—GO!"

If because of mistakes the lines become so numerous as to render the record confusing, examiner should give subject a fresh maze sheet and have him continue his tracing of the path from the point of interruption. These record sheets should be numbered 1, 2, etc., in order.

Scoring.—Record the time in seconds (*a*) from start signal "Go" to first pencil mark (this is adjustment period); (*b*) from beginning tracing at subject to finish, or calling of time by examiner (this is tracing time); (*c*) the total time, sum of (*a*) and (*b*). Record also the number of errors in tracing (an error is any movement of approximately a centimeter, or more, in a wrong direction).

Similarly present in turn mazes 11, 12, and 13, unless subject fails on two successive parts of the test.

Test E, form board.

Materials.—Form board No. 3, designed by W. F. Dearborn.

Directions.—(*a*) Place the board before subject, arranged as shown in figure A, problem A (p. 132). Say to subject, "Without making any more moves than you have to, change these blocks around so you can find a place for this extra square (point to square beside the board). Don't have any blocks left over. Ready—GO!"

Scoring.—Record time in seconds from start to finish, and the number of moves.

Time for work, 2 minutes.

(*b*) Present the board arranged for problem B, saying, "I want you to change the blocks around so you can find places for *these two extra squares* (point to them). Ready—GO!"

Time for work, 3 minutes.

(*c*) Present the board arranged for problem C, saying, "I want you to change the blocks around so you can find places for *these four extra blocks*. Ready—GO!"

Time for work, 4 minutes.

(*d*) Present the board arranged for problem D, saying, "I want you to change the blocks around so you can find places for *these five extra blocks*. Ready—GO!"

Time for work, 5 minutes.

Test F, construction (Stenquist).

Materials.—One set of Stenquist construction test, single series 1.

Directions.—Place the open box before subject, with cover open toward him. Say to him: "Take these mechanical things and put them together as they ought to be; that is, take the parts and put each thing together so that it will work perfectly. Begin with model A, then take B, then C, and so on. But if you come to one you can not do in about 3 minutes go on to the next one. The person who gets the most things right gets the highest score. Ready—GO!"

Scoring.—See directions for group tests (pp. 129–130). Plates showing various forms of construction are opposite pages 146–147 of this Guide.

Test G, orientational information.

Materials.—Set of 10 questions printed below and listed in record blank (*a*) to (*j*). They contain 20 items.

(*a*) When were you born? Where? What is your race or nationality?

(*b*) What day is it? What month? What day of the month? What year?

(*c*) Where are you now?

(*d*) Name the days of the week beginning with Sunday. Now name them backward beginning with Saturday.

(*e*) Name the months of the year beginning with January. Now name them backward beginning with December.

(*f*) In which month is "New Year's Day?" Christmas?

(*g*) How is leap year different from other years?

(*h*) Where does the sun rise? Set?

(*i*) If you face north what direction is to your right?

(*j*) Name the seasons. What season has the longest days? The shortest?

Directions.—This test is to be used for illiterates, those who have difficulty with English, or subjects who do very poorly in the group examination, the individual tests, or both. Examiner should use his judgment about its appropriateness and probable value. The test is recommended for subjects whose responses are irregular or otherwise peculiar and who may be psychotic.

Scoring.—So far as space and time permit response should be recorded; otherwise, record merely symbol for correct or incorrect response. Number of items correct may tentatively be used as measure of orientational information.

Test H, association.

Materials.—Stop watch and record blank.

Directions.—Say to subject, "Now I am going to read to you a list of ordinary English words, one at a time, words like fox, tree, green and such. Each time I speak a word you should answer by saying the first word that comes into your mind on hearing it; the very first word it makes you think of. So if I should say fox, you might answer geese,

or runs, or red, or tail, or animal, or any word that happened to come into your mind. If I should say tree, you might answer oak, or leaves, or green, or anything like that. Don't waste time hunting around for some especially good word. It doesn't make any difference whether I see any connection or not. Try a few to start with."

Then give sample words *fox*, *apple*, *fork*, *cure*, *quick*, *grass*, as far as necessary for illustration. Ordinarily one or two will be enough. As soon as subject has the idea, proceed with the experimental series. Speak stimulus words distinctly and with falling inflection. Start stop watch on beginning stimulus word and stop it on hearing the response.

Scoring.—Write each response legibly in the column provided for it, and immediately after it, in the same column, write the time in *fifths of a second*. Thus 1 2/5 seconds is written as 7. If no response is obtained in 30 seconds leave a blank and proceed to next stimulus word. If a response is not clearly heard, ask subject to repeat, spell, or otherwise indicate it clearly. If subject misunderstands a stimulus word, note what was understood. A seeming irrelevance may have been caused in this way. If subject asks to change a response previously given, the first is scored as actual response, but the second should be noted.

In recording the responses, note and mark tendencies to perseveration, sound association, or other responses of nonsense character. In large numbers these have been found indicative of psychopathic conditions.

Reaction times being distributed, their median should not be over 15 (3 seconds). Other indications of abnormal condition are: (1) Many inordinately long reaction times not explained by unintelligibility of the stimulus word to subject; and (2) predominance of "predicate" reactions with special value content, such as religion-uncertainty, work-distasteful, lion-frightful, and the like.

For numerical scoring of responses, use abridged Kent-Rosanoff frequency tables (supplied separately). The frequency of each response in a thousand cases is recorded from these tables in the column of the test blank provided for it. Score 5 for each response not found in abridged tables. If the median of these quantities is less than 20, abnormal mental processes are indicated.

Test I, digits backward.

Materials.—Series of digits for group test 2 (p. 127), forms A, B, etc.

Directions.—Examiner selects a particular series of digits (as for instance, those of form A), designates it by its appropriate letter on the record blank, and proceeds with the test. Each group of digits is read distinctly at the rate of one per second and recorded in the space provided, as reproduced by subject orally.

To subject, examiner says, "I am going to read some numbers to you. I want you to listen carefully and then say them backward,—this way—if I say 3—5—1 you should say 1—5—3. Now try this one. Listen! 5—8—1....." Response..... "and this: 9—4—6....." Response .....

Examiner now presents the several parts of the test in order until subject has failed on four parts in succession or finished.

(*a*) Examiner says to subject, "Listen carefully. I am going to say four numbers. When I stop, you say them backward. Ready!"

Examiner should state each time the number of digits to be given.

Test J, vocabulary.

Materials.—Accompanying five series of words.

Directions.—Place the list so that subject may see the words and pronounce them if he wishes. If a word is pronounced incorrectly, examiner should give the correct pronunciation. Formula: "What does the word ..... mean?" If subject hesitates or seems to think that he must give a formal definition, examiner says, "It doesn't matter how you say it. All I care for is to find out whether you know what the word means. Tell me the meaning any way you want to express it." Subject is encouraged as liberally as necessary.

Ordinarily it will not be necessary to secure responses to all of the 40 words in a series, as some will obviously be too hard or too easy for the subject being tested. This is especially true in series 1, the words of which have been graded accurately according to difficulty. In each series, however, the testing should be over a wide enough range to secure an accurate score.

Scoring.—Credit each response as + or −. Occasionally half credits may be given, but in general this should be avoided.

The score is + if the response shows that subject knows at least one approximately correct meaning of the word. It is not necessary that the meaning given be the most common one. The form of definition is disregarded in computation of score, but for clinical purposes it is well to designate especially superior definitions by + +.

Series 1.

1 lecture	11 forfeit	21 conscientious	31 gelatinous
2 guitar	12 majesty	22 philanthropy	32 milksop
3 scorch	13 shrewd	23 exaltation	33 declivity
4 bonfire	14 Mars	24 frustrate	34 irony
5 misuse	15 dilapidated	25 flaunt	35 incrustation
6 haste	16 hysterics	26 promontory	36 artless
7 puddle	17 priceless	27 infuse	37 laity
8 skill	18 tolerate	28 lotus	38 precipitancy
9 impolite	19 disproportionate	29 avarice	39 perfunctory
10 juggler	20 repose	30 embody	40 retroactive

Series 2.

1 hurry	11 dike	21 intrinsic	31 fervid
2 dizzy	12 navigable	22 congenial	32 maternal
3 spaniel	13 overlook	23 booty	33 decorous
4 decay	14 jubilant	24 bogus	34 weird
5 cautious	15 embers	25 optimist	35 surf
6 duel	16 conspicuous	26 interval	36 swoon
7 scoundrel	17 perpetual	27 stockade	37 oblong
8 noble	18 absorb	28 rant	38 implacable
9 voluntary	19 tragic	29 forego	39 symposium
10 encourage	20 unfurl	30 pallid	40 retrograde

Series 3.

1 forest	11 predict	21 masterpiece	31 corrode
2 escape	12 assemble	22 effeminate	32 franchise
3 moist	13 capitulate	23 petty	33 plastic
4 totter	14 annoy	24 scapegoat	34 emulsion
5 rubbish	15 contemplate	25 destitute	35 edict
6 undertake	16 bestow	26 bewilder	36 vesture
7 jumble	17 cooper	27 stamina	37 tweed
8 cog	18 swarthy	28 intermittent	38 curator
9 genuine	19 hypocrite	29 disruption	39 extirpate
10 repent	20 masculine	30 tenure	40 liturgy

Series 4.

1 beneath	11 brewery	21 pestilence	31 envoy
2 strap	12 avalanche	22 sagacity	32 gruesome
3 holiday	13 demonstrate	23 oasis	33 oscillate
4 trump	14 descend	24 valid	34 dissonant
5 transom	15 rational	25 shroud	35 heinous
6 expel	16 countless	26 aloof	36 heirarchy
7 enter	17 lank	27 requisite	37 radiate
8 century	18 illiterate	28 immaculate	38 elegy
9 wriggle	19 outwit	29 evade	39 labial
10 adventurous	20 emergency	30 alloy	40 vista

Series 5.

1 bonnet	11 jury	21 hostler	31 aquatic
2 vaccinate	12 endure	22 prostrate	32 heresy
3 echo	13 gullible	23 discreet	33 paternal
4 salve	14 ascend	24 clump	34 citron
5 intoxicated	15 transparent	25 hull	35 missile
6 abundant	16 courtesy	26 trellis	36 porous
7 blemish	17 melancholy	27 smolder	37 virile
8 republic	18 submit	28 pedestrian	38 amulet
9 enormous	19 humorist	29 opaque	39 laconic
10 cartoon	20 terminate	30 deluge	40 tendril

Test K, letter line.

Materials.—Two pages of letters, *a* and *b*, each containing five series, and the key to the letter test.

Directions.—(*a*) The examiner points each time to the group of letters to be arranged. While giving the directions for trial 1, he points to I and M and says, "You see these letters. Look at them carefully. If they were made out of cord or tape, the letter I would take a much shorter piece of tape than the M. You see what I mean. Arrange the letters according to the total length of cord or tape needed. First write the letter I, because that would take the shortest piece of tape, then the letter that would take the next shortest piece, and so on. Take plenty of time, and use your best judgment."

Examiner hands subject a piece of paper and a pencil. While subject does part (*b*), examiner copies subject's arrangement of (*a*) in space provided on blank, and so on.

(*b*) "Now do the same with these letters."

If more than one letter is misplaced in two successive trials, the test is discontinued. Examiner may give (*a*) or (*b*) of other series if he wishes to test subject further.

Scoring.—Record time and errors. Time allowed for work on each part, 2 minutes.

LETTER LINE, PART (a)

Series 1
(a) Z I M T N

Series 2
(a) V M L E I

Series 3
(a) M I Y X H

Series 4
(a) V I T M X

Series 5
(a) N I F M L

LETTER LINE, PART (b)

Series 1
(b) Y I M H V X

Series 2
(b) Z T K M N I

Series 3
(b) L M I A K F

Series 4
(b) E Y Z I M N

Series 5
(b) H T M Z I F

KEY TO LETTER LINE

Series 1
(a) I T Z N M
(b) I Y V X H M

Series 2
(a) I L V E M
(b) I T Z K N M

Series 3
(a) I Y X H M
(b) I L F A K M

Series 4
(a) I T V X M
(b) I Y Z E N M

Series 5
(a) I L F N M
(b) I T F Z H M

Test L, disarranged sentences.

Materials.—Dissected sentences given below.

Directions.—(*a*) Examiner shows subject set (*a*) of series selected for use (covering the others), and says, "I am going to show you some words. You will have one minute to put these words in their proper order so that they will make a good sentence; make good sense. Use all the words, but no others."

If the subject does not give a logical arrangement of the first sentence within one minute, read the sentence off correctly for him, pointing to each word as it is spoken.

Scoring.—Record the time. Write the first letter of each word as given by subject, and mark the response + or −.

Series 1.

(*a*) warm winter in we clothes wear

(*b*) trees roots have their ground the in

(*c*) skillful makes much careful become practice one

Series 2.

(*a*) feet wear to are shoes the on

(*b*) does angry not to it get pay

(*c*) summer makes in warm grow sunshine plants

Series 3.

(*a*) hard high to are mountains climb

(*b*) get grow they as children taller older

(*c*) plants becomes the when wither dry ground

Series 4.

(*a*) honey flowers gather bees the from

(*b*) horse elephant is smaller a than an

(*c*) steam it into when changes boils water

Series 5.

(*a*) times mistakes make men all at

(*b*) a than is automobile an slower horse

(*c*) snow change into cold often winds rain

Test M, absurdities.

Directions.—Examiner says to subject, "I am going to read something which has something foolish or funny in it, some nonsense. Listen and tell me what is foolish about it." Then examiner reads in order, somewhat slowly and in a matter of fact voice, the 10 absurdities of one of the five series. After each of the first three or four examiner says: "What was foolish about that?" If subject is silent for 15 seconds, examiner repeats, "What was foolish about that?" Then if there is no response in 15 seconds more, examiner goes to next. If subject fails on the first, that one is read again. The others are not to be read a second time unless examiner requests it.

If it is not clear from the response whether the absurdity has been detected, examiner says, "What do you mean?" Only this general form of question may be employed. Questioning which might suggest the right answer must be carefully avoided.

Scoring.—Each of the 10 items is scored + or −; no half credits. Plus means that the essential point in the absurdity has been detected.

Series 1.

(*a*) The poor sick man lay flat on his back, entirely speechless, and all his cry was, "Water! Water!"

(*b*) A man said, "I know a road from my house to the city which is down hill all the way to the city and down hill all the way back home."

(*c*) The fireman hurried to the burning house, got his fire hose ready, and after smoking a mild cigar put out the fire.

(*d*) The commissioners have decided to build a new jail out of the materials of the old jail, but they are going to keep the prisoners in the old jail until the new one is finished.

(*e*) I saw a nicely dressed gentleman on the street. He had his hands in his pockets and was swinging a cane.

(*f*) In an old graveyard in Virginia they have discovered a small skull which is believed to have been that of George Washington when he was about ten years old.

(*g*) A tramp found ten dollars. He went to a store and bought a hat for eight dollars and an overcoat for two dollars.

(*h*) John was saddling his horse one day and thoughtlessly put the saddle on backward. When told of his mistake, he said, "How do you know which direction I am going to ride?"

(*i*) A mistake is much worse than a lie, for all people make mistakes and only liars tell lies.

(*j*) The wind blew strong from the west and carried the smoke over the roof of the house straight toward the setting sun.

Series 2.

(*a*) A man had smallpox twice. The first time it killed him, but the second time he got well quickly.

(*b*) A bicycle rider being thrown from his bicycle in an accident struck his head against a stone and was instantly killed. They picked him up and carried him to the hospital, and they do not think he will get well again.

(*c*) The poor sick man lay flat on his back six weeks in the month of August and suffered terribly.

(*d*) While walking backward the man struck his forehead against a stone wall and was knocked insensible.

(*e*) Though armed with nothing but his pocketknife he killed the robber with a single shot.

(*f*) A man said to his friend, "I hope you will live to eat the chickens that scratch sand on your grave."

(*g*) Just before sunset we sat in the shade of a tall tree and amused ourselves by watching the shadows as they gradually grew shorter and shorter.

(*h*) A man said he liked the moon better than the sun, because the moon shines at night when we need the light while the sun shines in the day when it is already light.

(*i*) When the price of food is high, wages ought to be low in order to make things fair for everybody.

(*j*) There was once a man so strong that he could lift himself high off the ground by pulling up on his boot straps.

Series 3.

(*a*) One day we came in sight of several icebergs that had been entirely melted by the warmth of the Gulf Stream.

(*b*) Yesterday the police found the body of a girl cut into eighteen pieces and they believe that she killed herself.

(*c*) A father wrote to his son, "I inclose ten dollars. If you do not receive this letter, please send me a telegram."

(*d*) A man wished to dig a hole in which to bury some rubbish. He could not decide what to do with the dirt from the hole. A friend suggested that he dig the hole large enough to hold the dirt too.

(*e*) At the crossroads was a guidepost with the following directions: "Philadelphia, 3½ miles. If you can not read, inquire at the blacksmith shop.

(*f*) The reason why winter is colder than summer is because in winter there is a large amount of snow, while in summer there are only warm rains.

(*g*) Walter came to school tardy only one day last year, and that was Christmas morning.

(*h*) With an umbrella under her arm and a purse in her right hand the daintily dressed woman walked slowly along the road in a heavy rain.

(*i*) When wages are low, laborers should get their pay in gold rather than in silver, because gold, being more precious than silver, will buy more food.

(*j*) It is safer to travel in an automobile than on a train, because a train wreck may kill a hundred people while an automobile wreck never kills more than a few.

Series 4.

(*a*) Walter now has to write with his left hand because two years ago he lost both his arms in an accident.

(*b*) An engineer said that the more cars he had on his train the faster he could go.

(*c*) A well-known railroad had its last accident five years ago and since that time it has killed only one person in a collision.

(*d*) They found the young man locked in the room with his hands and feet tied behind him. They think that he locked himself in.

(*e*) I read in a paper that they fired two shots at a man. The first shot killed him, but the second did not.

(*f*) An old lady says that God is very good, because He always makes the largest rivers flow past the largest cities.

(*g*) An Irishman called at the post office to get his mail. "What is your name?" said the postmaster. "Why?" said the Irishman, "you will find my name on the envelope."

(*h*) A kind-hearted man who was taking a heavy bag of grain to town on his horse, sat on his horse and lifted the bag to his own shoulder in order to make the load easier for his horse.

(*i*) A gentleman fell from his carriage and broke his neck, but received no further damage.

(*j*) In some States there are laws to prevent a man from marrying his widow's sister.

Series 5.

(*a*) It has been found that the last car of a train is damaged most in case of accident. It therefore seems best to leave off the last car.

(*b*) There was a railroad accident yesterday, but it was not very serious. Only forty-eight people were killed.

(*c*) A wheel came off of Frank's automobile and as he could not get the wheel back on he had to run his automobile to the shop for repairs.

(*d*) A boy who was asked where Mr. Smith lived, said, "The first house you come to is a barn. The next is a haystack. The next is Mr. Smith's."

(*e*) The storm which began yesterday has continued three days without a break.

(*f*) Henry's dog has three puppies, so when Henry builds a little house for them he will have to make one large door for the mother dog and three small doors for the three puppies.

(*g*) The judge said to the prisoner, "You are to be hanged, and I hope it will be a warning to you."

(*h*) Frank and his sister brush their teeth every morning. Once Frank made a mistake and brushed his teeth with his sister's brush. This made his sister very angry, and she got even with him by brushing *her* teeth with *his* brush.

(*i*) The main difference between a president and a king is that a king sits on a throne, while a president sits on a chair.

(*j*) They began the meeting at two o'clock, but they set the hands of the clock back so that the meeting might surely close before sunset.

Test N, controlled association (rimes.).

Materials.—List of words, given below.

Directions.—(*a*) Examiner says, "You know what a rime is. 'Hat,' 'rat,' and 'cat' rime because they sound alike. 'Unite,' 'light,' and 'anthracite' also rime with one another because they all end in 'ite.' (Pronounce.) Now I'll give you a word and you will have one minute to tell me as many words as you can—short words or long words—that rime with it. The word is—examiner gives word (*a*) of series selected for use. Tell me all the words you can think of that rime with ———."

Scoring.—Write down as many of the responses as possible and record the number of right and wrong responses given within the time limit.

Time of work, 1 minute for each part.

(*b*) "Tell me all the words you can think of that rime with ———." Examiner gives word (*b*) of same series, taking care to stress the last syllable only; e. g., permit′.

Series 1.	Series 2.	Series 3.	Series 4.	Series 5.
(*a*) stone.	(*a*) load.	(*a*) pan.	(*a*) fear.	(*a*) pour.
(*b*) permit.	(*b*) without.	(*b*) until.	(*b*) unwrap.	(*b*) combine.
(*c*) resist.	(*c*) receive.	(*c*) desire.	(*c*) began.	(*c*) severe.

Test O, likenesses and differences.

Directions.—Examiner selects one of the five series and gives its 10 items in the order in which they come in the "Guide." When a difference is asked for, the formula is, "What is the difference between ——— and ———?" When a likeness is asked for, the formula is, "In what way are ——— and ——— alike?"

If a likeness is given when a difference is asked for (or vice versa), examiner says, "No, tell me the *difference* between ——— and ———" (Or, "Tell me how ——— and ——— are *alike*.") Only in such cases is a second trial given, but a correction spontaneously offered is accepted. If the meaning of a response is not clear, examiner says, "What do you mean?" No other questioning is permissible. If subject hesitates to attempt a response he should be encouraged.

Scoring.—Each item should be scored + or −. Half credits are not allowed. For items (*a*) to (*h*) of each series, any real likeness or difference) is satisfactory; it need not be the most essential one. The standard of scoring corresponds to that employed in current Binet procedure.

Item (*i*) is passed only if an essential likeness is given, though it need not be elegantly expressed. The essential similarities called for in the (*i*) items are considered to be as follows:

coal—a waterfall; sources of power, heat, or electricity.

addition—multiplication; multiplication a short method of addition; both accomplish the same thing, etc.

eye—ear; both sense organs, avenues of information, etc.

egg—seed; beginning of development; or a sex product.

farm—factory; places where things are produced.

The scoring of item (*j*) is analogous to that for Binet's test of giving differences between abstract words.

For *president—king*, any one of the three main differences (power, accession, tenure) is acceptable.

When possible, the response should be recorded, in abbreviated form. When a response can not be graded definitely as + or −, examiner should say, "In what *other* way are ——— and ——— alike (different)."

If a difference is given when a likeness is asked for, examiner writes (*d*). If a likeness is given when a difference is asked for, this is indicated by (*l*).

(*N. B.*—Attention is called to the possible significance of difficulty caused subject by the shift of Aufgabe from giving likenesses to giving differences, or vice versa.)

Series 1.

(*N. B.*—In all the series differences are indicated by an *.)

*(*a*) What is the difference between a cannon and a rifle?
(*b*) In what way are a hat and a coat alike?
(*c*) In what way are a hoe and a razor alike?
*(*d*) What is the difference between a hatchet and a hammer?
(*e*) In what way are a rose, a potato, and a tree alike?
(*f*) In what way are a table, a chair, and a bed alike?
*(*g*) What is the difference between a president and a king?
(*h*) In what way are a cat, a snake, a bird, and a fish alike?
(*i*) In what way are the eye and the ear alike?
*(*j*) What is the difference between character and reputation?

Series 2.

*(a) plate—saucer.
(b) pen—pencil.
(c) animal—plant.
*(d) the sun—the moon.
(e) snake—cow—sparrow.
(f) lamb—calf—child.
*(g) lawyer—judge.
(h) grass—cotton—tree—thistle.
(i) coal—a waterfall.
*(j) mistake—lie.

Series 3.

*(a) cat—hen.
(b) watch—clock.
(c) mosquito—sparrow.
*(d) nail—screw.
(e) wool—cotton—leather.
(f) spider—fly—elephant.
*(g) rascal—thief.
(h) ship—bicycle—automobile—train.
(i) egg—seed.
*(j) anger—rage.

Series 4.

*(a) knife—fork.
(b) needle—pin.
(c) steam—electricity.
*(d) bucket—basket.
(e) book—teacher—newspaper.
(f) physician—surgeon—dentist.
*(g) surgeon—ordinary physician.
(h) dog—tree—spider—eagle.
(i) farm—factory.
*(j) laziness—idleness.

Series 5.

*(a) hat—cap.
(b) cigar—cigarette.
(c) brick—stone.
*(d) river—lake.
(e) knife blade—penny—piece of wire.
(f) scissors—knife—axe.
*(g) man—gentleman.
(h) water—blood—oil—milk.
(i) addition—multiplication.
*(j) poverty—misery.

Test P, ingenuity.

Directions.—The formula is as follows: "A soldier must measure out exactly 3 ounces of medicine for a sick comrade. He has only an 8-ounce bottle and a 5-ounce bottle to do it with. Show how he can use these two bottles to get just the right dose of 3 ounces without any guessing. Begin by filling the 8-ounce bottle." Examiner writes 8—5—3 on a piece of paper, leaves it in sight of subject, and says, "Remember you have an 8-ounce bottle and a 5-ounce bottle to get exactly 3 ounces. Tell me how you would do it and tell me everything you do." Directions are not to be repeated. Subject is not allowed to figure with a pencil. The solution must be given orally.

The above illustration of the formula is for problem (a) of series 1. The other (a) problems are stated in the same way, using the appropriate numbers. In giving the (b) problems and (c) problems the formula is abbreviated to, "This time you have a 5-ounce bottle and a 7-ounce bottle to get 3 ounces; begin by filling the 5-ounce bottle."

One series of three problems should be given to each subject. The problems are always to be presented in the order (a), (b), (c).

Time allowed is 2 minutes for the (a) problems and 5 minutes each for the (b) and (c) problems. Work on the (b) and (c) problems is discontinued after 2 minutes if subject has not completed the third step in the solution. When any problem has been failed the experiment is discontinued.

The solution must be unaided other than by general encouragement. If subject asks if the bottles are marked, examiner should say "No." If subject asks whether it is permissible to pour from one bottle to another, the answer is "Yes."

Scoring.—Examiner records all the steps made by subject, or as nearry all as possible. The recording should be done in the notation employed in the problem lists below. Thus, for problem (a) the steps are f8 (fill 8); 8t5 (pour from 8 to 5); e5 (empty 5). The steps taken are *not* to be *numbered* in the record blank; they are merely recorded in order in the above notation.

(*N. B.*—Examiner. Observe that one of the measures must be filled or emptied at each step in a correct solution. It will be noted that each of the problems as written below gives first the measure to be filled first, then the other measure, and then the quantity to be obtained. Thus 8—5—3 means an 8-ounce bottle and a 5-ounce bottle to get 3 ounces; the 8-ounce bottle to be filled first.)

INGENUITY PROBLEMS.

No.	Problems.	Steps.							Solution.
		1	2	3	4	5	6	7	
				SERIES 1.					
1a	8—5—3	f8	8t5	e5	.....	.....	.....	.....	3 in 8
1b	5—7—3	f5	5t7	f5	5t7	e7	.....	.....	3 in 5
1c	9—7—4	f9	9t7	e7	9t7	f9	9t7	e7	4 in 9
				SERIES 2.					
2a	7—4—3	f7	7t4	e4	.....	.....	.....	.....	3 in 7
2b	8—5—11	f8	8t5	e5	8t5	f8	.....	.....	8+3=11
2c....	4—9—3	f4	4t9	f4	4t9	f4	4t9	e9	3 in 4
				SERIES 3.					
3a	9—4—5	f9	9t4	e4	.....	.....	.....	.....	5 in 9
3b	7—4—10	f7	7t4	e4	7t4	f7	.....	.....	7+3=10
3c	5—8—7	f5	5t8	f5	5t8	e8	5t8	f5	2+5=7
				SERIES 4.					
4a	9—5—4	f9	9t5	e5	.....	.....	.....	.....	4 in 9
4b	8—7—9	f8	8t7	e7	8t7	f8	.....	.....	8+1=9
4c	6—7—11	f6	6t7	f6	6t7	e7	6t7	f6	6+5=11
				SERIES 5.					
5a	9—7—2	f9	9t7	e7	.....	.....	.....	.....	2 in 9
5b	6—8—4	f6	6t8	f6	6t8	e8	.....	.....	4 in 6
5c	7—5—4	f7	7t5	e5	7t5	f7	7t5	e5	4 in 7

Test Q, memory for designs.

Materials.—Use the four plates of designs on pages 147–148. Examiner provides subject with pencil and paper beforehand.

Directions.—Formula for (*a*) and (*b*): "I am going to show you a drawing. You will have just 10 seconds to look at it, then I will take it away and let you draw it from memory. Don't begin till I say 'Go.'" Formula for (*c*) and (*d*): "This time I will show you two drawings. You will have only 10 seconds to look at them, then I will take them away and you are to draw them both from memory."[1]

Before exposing the designs, examiner says, "Ready. Look closely." When designs are removed, examiner says, "GO."

Designs are exposed with greatest length of page horizontal, and with front of "guide" toward examiner.

Scoring.—The possible scores for each of the four items are full credit, half credit, failure. The standards for these scores correspond to current scoring of the Binet design. Full credit is given only if the essential plan of the design has been grasped and reproduced. A slight error reduces the credit to half. Half credit is given for (*c*) and (*d*) when one of the two parts is reproduced correctly and the other half correctly.

Full credit is given for (*d*) only in case—(1) left design is drawn with four parts and the right with six; (2) the right design is made longer than the left; (3) the divisions of the left design are made equal and those of the right progressively smaller from left to right.

Test R, logical memory.

Materials.—(1) Paragraphs designated as passage 1, 2, 3, etc., on page 142; (2) tracing paper.

Directions.—Having selected a passage for use and recorded its number in the place provided on the record blank, examiner places the passage (in guide) before subject, and says, "Read this out loud. *Try to remember it as well as you can.* No matter whether you remember the exact words or not."

The time of reading is to be measured with a stop watch. Errors (omissions or changes) and defective articulations are to be recorded. Mistakes which are corrected are not counted.

As soon as subject has finished reading, examiner takes the guide, places a piece of tracing paper over the barred copy of the passage and says, "Now tell me what you read." Examiner should indicate each idea recalled by marking it on the tracing paper. If subject pauses for 15 seconds, examiner says, "What else?" Allow credit for responses begun during the next 15 seconds, after which discontinue the test. Examiner should record all false memories or tendencies to fabrication.

Time for recall, 2 minutes.

[1] Begin with design (*a*), on p. 148, and give in the order (*a*), (*b*), (*c*), (*d*).

The American liner New York struck a mine near Liverpool Monday evening. In spite of a blinding snowstorm and darkness, the sixty passengers, including women, were all rescued, though the boats were tossed about like corks in the heavy sea. They were brought into port the next day by a British steamer.

Passage 1.

The American | liner | New York | struck a mine | near Liverpool | Monday evening. | In spite of a blinding snowstorm | and darkness, | the sixty passengers, | including women, | were all rescued, | though the boats | were tossed about | like corks | in the heavy sea. | They were brought | into port | the next day | by a British | steamer. |

The children of Washington recently gave $2000 for the school playgrounds of the city. They got this money by collecting old newspapers from their homes and public places, putting them in bales and selling them. They gathered over a hundred tons of papers. This money will be used to improve the playgrounds and buy athletic goods for them.

Passage 2.

The children | of Washington | recently gave | $2000 | for the school | playgrounds | of the city. | They got this money | by collecting | old newspapers | from their homes | and public places, | putting them in bales | and selling them. | They gathered | over a hundred tons of papers. | This money will be used | to improve | the playgrounds and buy athletic goods for them. |

Dogs are trained to find the wounded in war time. Police dogs are also trained to rescue drowning people. Instead of running down to the water and striking out, they are taught to make a flying leap, by which they save many swimming strokes and valuable seconds of time. The European sheep dog makes the best police dog.

Passage 3.

Dogs | are trained | to find | the wounded | in war time. | Police dogs | are also trained | to rescue | drowning people. | Instead of running down to the water | and striking out, | they are taught | to make a flying leap, | by which they save | many swimming strokes | and valuable | seconds of time. | The European | sheep dog | makes the best police dog. |

Many school children in northern France were killed or fatally hurt, and others seriously injured when a shell wrecked the school-house in their village. The children were thrown down a hillside and across a ravine a long distance from the school-house. Only two children escaped uninjured.

Passage 4.

Many | school children | in northern | France | were killed | or fatally hurt, | and others seriously injured | when a shell | wrecked | the school-house | in their village. | The children | were thrown | down a hillside | and across | a ravine | a long distance | from the school-house. | Only two children | escaped uninjured. |

Anna Thompson of South Boston, employed as a scrub woman in an office building, reported at the City Hall Station that she had been held up on State Street the night before and robbed of about five dollars. She had four little children and the rent was due. The officers made up a purse for her.

Passage 5.

Anna Thompson | of South Boston, | employed as a scrub woman | in an office building, | reported | at the City Hall | Station | that she had been held up | on State Street | the night before | and robbed | of about five dollars. She had four | little children | and the rent | was due. | The officers | made up | a purse | for her. |

Test S, comprehension test.

Directions.—Say to subject, "I am now going to ask you some questions. Listen closely, and answer them as well as you can." Then give the five questions of the series chosen for use slowly and distinctly, with expression. Subject may be given such encouragement to reply as the occasion demands, but examiner must avoid suggesting correct answers. If the response is too vague, question further in such terms as, "What do you mean?" "What makes it so and so?" and the like. Questions may be reread once if subject requests it. Effort should be made to secure a response which can be scored as + or −.

The purpose of the test is to indicate the *reasonableness* of subject's mental processes. Disturbances of thought processes may be topical, and many questions fail to bring them out, whereas others do. In examining a suspected psychotic, examiner should give, in addition to one of the regular series, selections from other series, using such questions as in his judgment are best suited to bring out the suspected abnormality.

Scoring.—The scoring for each item remains to be worked out. For this reason it is important that examiner record enough of each response to give its essential content. This will make possible the later alteration of scores.

Effort should be made to score each response as + or − according to some definite standard. Current standards for scoring the Binet "difficult comprehension" questions will serve as a point of departure. Absurd responses should be especially noted.

Time for response, 1 minute for each question. If the subject requests a second reading, the time is measured from the end of the second reading.

Series 1.

(*a*) If you have a bucket full of eggs in one hand and an empty basket in the other, and a man offers to give you some sweet cider, how would you get it home?

(*b*) Why is it better to judge a man by what he does than by what he says?

(*c*) Why should people have to pay taxes?

(*d*) Why are people who are born deaf usually dumb?

(*e*) Why does land in the city cost more than land in the country?

Series 2.

(*a*) If a child runs out in front of an automobile and is run over by it, what should the driver do?

(*b*) If you picked up a pocketbook on the road with a hundred dollars in it, what would you do to find the owner?

(*c*) Which would you forgive more quickly; a man who did you an injury when he was angry, or a man who did you an injury when he wasn't angry?

(*d*) Why is it better to pay bills by check than by cash?

(*e*) Why are unmarried men preferred for military service?

Series 3.

(*a*) What should you do if you find a sealed, stamped, and addressed envelope in the street?

(*b*) What should you do with a 2-year-old child that you find lost on a city street?

(*c*) What should you say if someone asks your opinion about somebody you don't know very well?

(*d*) Why is it often a good thing for a man to have his life insured?

(*e*) Why do banks usually prefer married men for cashiers?

Series 4.

(*a*) You are hauling a load of lumber; the horses get stuck in the mud, and there is no help to be had. What should you do?

(*b*) Your mother is sick and has no money. You earn a dollar and are taking it to her. On the way you meet a child who cries and wants a nickel for some candy. What should you do?

(*c*) Why has New York become the largest city in America?

(*d*) Why is a man who borrows money willing to pay interest on it?

(*e*) Why should women and children be saved first in a shipwreck?

Series 5.

(*a*) What should you do if your neighbor dumps rubbish in your dooryard?

(*b*) Why is electric light better than gaslight?

(*c*) You are driving along a lonely road with a wagonload of people, and you meet a man badly hurt lying in the road. Your wagon can not hold any more, and no other help may come for hours. What should you do?

(*d*) Why should people have to get a license to get married?

(*e*) A man is 60 years old and has nobody to keep but himself. He has ten thousand dollars. What should he do with it?

Test T. sentence construction (three words).

Materials.—Sets of three words, given below.

Directions.—(*a*) Examiner says, "Now, I am going to give you three words. Join them with other words in any order so as to make a sentence that has all three words in it. The three words are (examiner reads set (*a*) of series selected for use). Go ahead and make up a sentence that has all three words in it."

N. B.—Examiner: Do not show the words or illustrate what a sentence is. If the subject does not begin to respond within a minute, repeat the directions, using set (*b*). If still there is no response within a minute, discontinue the test.

Scoring.—Write down what the subject says and score the test + or —.

(*b*) Examiner says, "Now make up a sentence that has these three words in it." (Examiner reads set (*b*) of series being used.)

(*c*) Same procedure as for (*b*), using set (*c*).

Series 1.

(*a*) grocer, sugar, scales
(*b*) thread, cloth, button
(*c*) pleasure, theater, people

Series 2.

(*a*) forest, gun, hunter
(*b*) parade, crowd, circus
(*c*) success, books, information

Series 3.

(*a*) accident, train, night
(*b*) water, fish, animal
(*c*) wealth, miser, friends

Series 4.

(*a*) woman, ribbon, hat
(*b*) cloud, light, moon
(*c*) poverty, spendthrift, fortune

Series 5.

(*a*) plants, root, ground
(*b*) newspaper, fire, city
(*c*) business, invention, machine

Test U, arithmetical reasoning.

Say to subject, "If a man buys —— cents worth of postage stamps at the post office and pays a (dime, quarter, half dollar, dollar), how much change does he get back?"

Series of Problems.

Series.	(a)	(b)	(c)	(d)
1	6 from 10	8 from 25	14 from 50	53 from 100
2	4 from 10	9 from 25	13 from 50	36 from 100
3	3 from 10	7 from 25	16 from 50	27 from 100
4	7 from 10	6 from 25	12 from 50	61 from 100
5	8 from 10	4 from 25	17 from 50	43 from 100

Time for each problem, 15 seconds.

One series of these simple problems is to be given. If they are readily solved, subject should be tested further with one of the following problems:

1e. If a man's salary is $20 a week and he spends $14 a week, how long will it take him to save $300?

2e. If 2 pencils cost 5 cents, how many pencils can you buy for 50 cents?

3e. At 15 cents a yard, how much will 7 feet of cloth cost?

4e. Six men can dig a trench in three days. How many men will it take to dig it in half a day.

5e. If a man buys two cigars at 7 cents each and a pipe for 65 cents, how much change should he get from a $2 bill?

Time for each problem, 1 minute.

Test V, code learning.

Materials.—Accompanying sample code and five test codes, designated by numbers.

Directions.—Examiner shows subject the sample code, saying, "These lines (illustrating with pencil drawings of symbols) are used to represent letters in a kind of secret writing." Examiner now shows how the word son may be written with the code symbols. Then he says, "Now I am going to show you a form in which different letters are used. Study it carefully until I take it away." Examiner presents one of the five codes for 20 seconds. He then places before subject a sheet of paper on which the letters from e to m (in alphabetical order) have been written in advance, and says, "Put the lines which stand for it around each letter."

(*N. B.*—Examiner must not allow subject to redraw the code figure from memory.)

Scoring.—On the record blank examiner enters a symbol, + or −, according to whether the response is correct or incorrect. The total number of correct responses is also to be recorded.

Time for work in writing the symbols, 2 minutes.

Sample code.

p	w	q
t	o	n
u	r	s

s	o	n

Code 1.

h	g	m
i	f	l
j	e	k

Code 2.

j	k	e
i	l	f
h	m	g

Code 3.

k	e	j
l	f	i
m	g	n

Code 4.

k	l	m
e	f	g
j	i	h

Code 5.

j	i	h
k	l	m
e	f	g

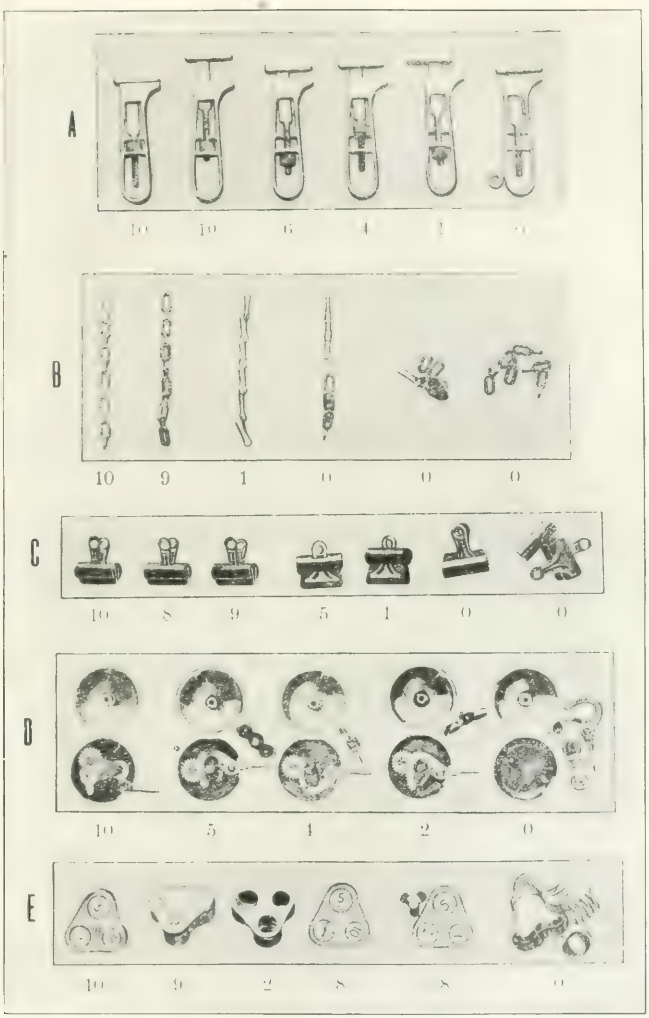


Fig. B.—SCORE VALUES FOR VARIOUS TYPES OF PERFORMANCE WITH STENQUIST MATERIALS.

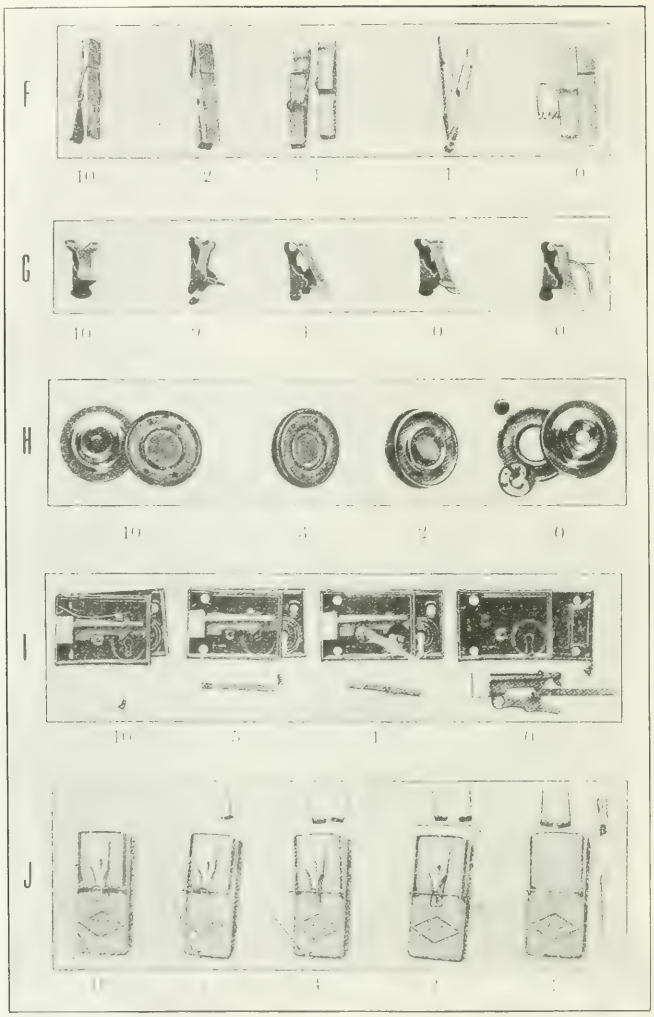


Fig. C.—SCORE VALUES FOR VARIOUS TYPES OF PERFORMANCE WITH STENQUIST MATERIALS.

STENQUIST CONSTRUCTION TEST, SINGLE SERIES I.

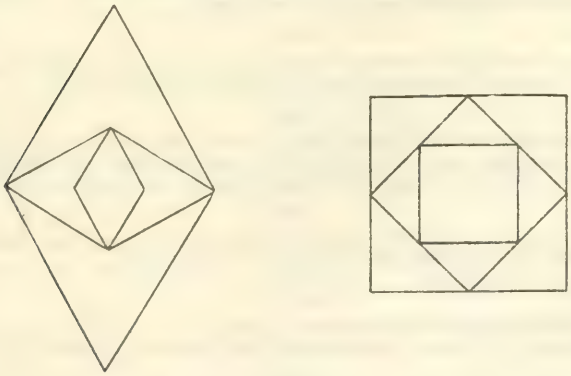
[Standard score values. Standard time, 30 minutes. All scores on a scale of 0 to 10.]

	Penalty.	Score.
A. Wrench:		
Perfect		10
Nut toward handle		6
Nut toward head		4
Head wrong and nut wrong		1
Merely stuck together, nut neglected		0
B. Chain:		
Perfect		10
All links right but one		9
Links half looped		1
Links merely stuck in, etc		0
C. Paper clip:		
Perfect		10
One lever reversed		8
Both levers reversed		9
Levers in right place, but not clear in		5
Levers put in backward		1
Parts merely stuck together, aimlessly		0
D. Bicycle bell:		
Perfect		10
Correct except spring not hooked		5
Correct except lever reversed and spring unhooked		4
Lever and spring O. K., pinion wrong		2
(Hammer and cover counted as in place in above).		
Hammer wrong, add 2 to other penalties		0
No attempt		0
E. Coin holder:		
Perfect		10
Correct, but cover unhooked		9
Caps out of place	8	2
Center stud omitted or inverted	2	8
Center stud misplaced		8
No attempt		0
F. Clothes pin:		
Perfect		10
Spring over large end		2
Spring in place on one lever only		1
Spring over small end		1
All parts misplaced, or no attempt		0
G. Shut off, for rubber hose:		
Perfect		10
Lever reversed		9
Lever underneath		1
Parts merely stuck together aimlessly		0
No attempt		0
H. Push button:		
Perfect		10
Correct except not snapped shut, i. e., merely laid together in correct position		3
Merely laid together, back reversed		2
No attempt		0
I. Lock:		
Perfect		10
Correct except spring omitted or wrong		5
Bolt only in place, other parts wrong		1
(Cover is assumed to be in place in all the above).		
No attempt		0
J. Mouse trap:		
Perfect		10
All right except one spring		7
Both springs wrong, otherwise right		4
Only loop lever, pin, and bait trigger right		2
Only loop lever and pin right		1
No attempt		0

N. B.—Examiner: A few cases will occur in which the degree of performance does not conform to any of the above. Mark such values as equal to the one nearest like it above.

d. 1 d. 2

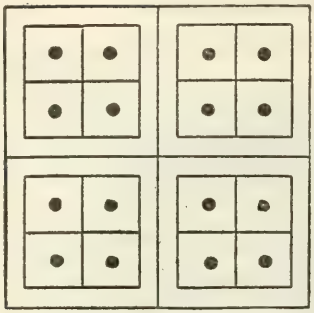
Fig. D[1]—Exposure designs for Test Q, p. 141.



c. 1 c. 2

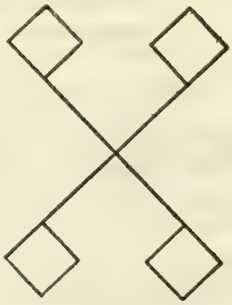
Fig. E[1]—Exposure designs for Test Q, p. 141.

[1] Exposure designs of Figs. D to G were presented to subject in the order indicated by small letters a, b, c, and d.



b

Fig. F[1]—Exposure design for Test Q, p. 141.



a

Fig. G[1]—Exposure design for Test Q, p. 141.

SECTION 2.—*Directions for scoring examination a.*

[Sent out as supplement to the Examiner's Guide first revision.]

Test 1.

Item 3.—The line may begin or end either on the circumference or within the circle and may just touch either of the inner circles but should not cut through either one.

Item 4.—In this and item 5 the figures or cross should not be made to extend across any black line unless slightly as though by accident.

Item 6.—Here the proper numbers may be crossed out in any manner, but underlining is counted wrong.

Item 8.—In the circle marked "not 12" (on stencil) there may be any number which is not 12, such as 5, 0, 27.

Item 10.—Underlining in place of crossing out counts wrong and vice versa.

Test 2.

If all the digits in any set are given and in the right order, the set may count as right, even though written in the wrong line of squares. No set is correct unless the digits are all given and in the right order.

Scorers should take notice when the same error occurs throughout the blanks of a given group and consider the possibility of an error having been made by the examiner in giving the test.

Test 3.

If in each item the proper word "true" or "false" is clearly indicated in any manner, such as by a check, the item may count as right. If only the word "true" is underlined all the way down the page, or similarly only the word "false," a score of zero may be given immediately with no further notice.

Test 4.

Items 9 and 13 may count as right, even though the decimal point is left out, providing, of course, the figures are right. The fraction in item 15 may be expressed either as a decimal or as a common fraction.

Test 5.

If in any item the proper word is clearly indicated in any manner, such as by check or by crossing out the other three, the item may count as right. However, if two or more of the last four words in each line are underlined or otherwise indicated, the item shall count as wrong. Underlining words other than the last four may be overlooked.

Test 6.

If in each item the proper word "same" or "opposite" is clearly indicated, as by a check, the item may count as right. If only the word "same" is underlined all the way down the page, or similarly only the word "opposite," a score of zero should be given immediately.

Test 7.

If in any item the proper answer is clearly indicated in any manner, as by a check in the square or by underlining, the item may count as right. If, however, in any item two or more answers are indicated, the item shall count as wrong.

Test 8.

Here the proper number should be put in each blank place.

[1] Exposure designs of Figs. D to G were presented to subject in the order indicated by small letters a, b, c, and d.

Test 9.

If in any item the proper word in the parenthesis is clearly indicated in any manner, the item may count as right. However, if two or more words in a parenthesis are indicated, the items shall count as wrong. Underlining words outside the parenthesis may be overlooked.

Test 10.

If in any item the proper numbers are clearly indicated in any manner, the item may count as right. If more than two numbers are indicated in any column, however, the item shall count as wrong.

In any test, responses which have been corrected stand as corrected.

SECTION 3.—*Instructions for scoring and combining tests of individual examination series.*

The method of scoring and combining the tests of the individual examination series was based on tests of 340 unselected men in Camps Devens, Lee, and Taylor.

The method involves the following procedure: (1) A raw score is obtained for each test, A, B, C, etc. (2) Each of these raw scores is transmuted into an "equalized" or "absolute" score by means of a table. (3) These "absolute" scores are then averaged and the average is multiplied by 10 to clear it of decimals. The score thus obtained is the measure of intelligence.

The method of combining the scores of the several tests was arrived at as follows: For the tests in which time was not counted, frequency distributions were plotted for number of right responses. These tests are listed in table 9. For the remaining tests (listed in table 10) distributions were plotted both for time and amount accomplished. On the basis of these plots, rules were drawn up for the assignment of points both for time and accomplishment. These rules are embodied in table 10. The intention of the plan is to assign equal increments of points for theoretically equal increments of merit both in speed and accomplishment. For each of the tests a raw score was secured according to the directions in table 9, table 10, and the "Instructions for Scoring."

The assumption was made that the degrees of performance in each test attained by the same percentage of the group were equal in absolute value. The further assumption was made that the abilities of the individuals of the group in each test were distributed normally. On the basis of these assumptions the achievement of the median individual was assigned the absolute value of 15 points. The lower quartile achievement was assigned 10 points, the upper quartile of achievement was assigned 20 points, and other percentages were assigned values in accordance with the assumption made regarding distribution of intelligence.

This operation was accomplished as follows: Distributions of the total raw scores in each of the tests A to V, excluding tests F and H, were plotted in the ogive form and smoothed. A scale was then applied to the ogive in each case and values were assigned to the scores attained by each percentage of individuals corresponding to the values of y which would correspond to the same percentages if the ogive had been normal. The absolute values of scores ranged in most cases from approximately zero to approximately 30. In several instances, however, where a large number of individuals got a raw score of zero, it was necessary to give an absolute value somewhat above zero to the raw score of zero.

The intention is that a single absolute measure of the intelligence of an individual may be obtained by averaging the absolute scores in any number of tests, and multiplying by 10 to clear of decimals. Assuming the data on which the method was based to be representative, the absolute (that is, the weighted or equalized) total score of an individual of median ability should be approximately 150. The upper and lower quartile scores should be approximately 200 and 100, respectively.

TABLE 9.—*Scoring of tests in which time is not counted.*

Test.	Score.	Score range.
C. Cancellation	Number of correct responses	0 to 20
G. Orientation	Number of correct items	0 to 21
I. Digits backward	Number of correct responses	0 to 10
J. Vocabulary	Number of correct definitions	0 to 40
M. Absurdities	Number of correct items	0 to 10
O. Likenesses and differences	Number of correct items	0 to 10
Q. Design	2 for each correct design; 1 for each design half correct	0 to 12
R. Logical memory	Number of ideas recalled	0 to 20
S. Comprehension	Number of correct items	0 to 5
U. Arithmetical problems	do	0 to 5
V. Cancellation	do	0 to 9

TABLE 10.—*Scoring of tests in which time is counted.*

TEST A.

Moves: Credit.							Time: Credit only if blocks assembled.					
Points	5	4	3	2	1	0	Points	5	4	3	2	1
(a)	9	11	15	25	50	Over.		10	25	50	80	120
(b)	9	11	15	25	50	Over.		20	30	50	80	120
(c)	8	10	15	25	50	Over.		20	30	50	80	120
(d)	27	29	33	40	70	Over.		60	120	180	240	300
(e)	27	29	33	40	70	Over.		60	120	180	240	300

TABLE 10.—*Scoring of tests in which time is counted*—Continued.

TEST B.

	Time: Credit only if answer correct.			
Points	4	3	2	1
(a)				
(b)			7	15
(c)		7	15	30
(d)	7	15	30	60
(e)	7	15	30	60

Suggestion: For each instance of questioning by examiner count off 1 point.

TEST D.

Successful steps: Credit whether in time limit or not.						Time: Credit only if exit made without crossing line of maze.				
Points	5	4	3	2	1	Points	3	2	1	0
(a)	5	4	3	2	1		20	40	70	120
(b)	5	4	3	2	1		20	40	70	120
(c)	5	4	3	2	1		20	40	70	120
(d)	5	4	3	2	1		20	40	70	120

For each correction by examiner count off 1 point.

TEST E.

Moves: Credit only if problem solved.							Time: Credit only if problem solved.					
Points	5	4	3	2	1	0	Points	5	4	3	2	1
(a)			3	4	7	Over.		10	20	40	70	120
(b)			5	6	10	Over.		10	20	40	70	120
(c)	8	9	11	14	20	Over.		20	40	70	110	180
(d)	9	10	12	15	20	Over.		20	40	70	110	180

TEST K.

Degree of success: Credit.			Time: Credit only if correct.			
Points	6	3	Points	3	2	1	0
(a)	Correct	Reversal of 2.		15	30	60	120
(b)	do	do		15	30	60	120

TEST L.

Success: Credit.			Time: Credit only if correct.				
Points	5	3	Points	3	2	1	0
(a)	Correct (spontaneous).	Correct (after suggestion)		7	15	30	60
(b)	do	do		7	15	30	60
(c)	do	do		7	15	30	60

TEST N.

Number rimes: Credit.						Time: Credit only if five rimes given with no errors.				
Points	7	6	5	4	1	Points	3	2	1	0
(a)	5	3	2	1	Each error.		10	20	40	60
(b)	5	3	2	1	do		10	20	40	60
(c)	5	3	2	1	do		10	20	40	60

TEST P.

	Time: Credit only if solution correct.			
Points	8	7	6	5
(a)	15	30	60	120
(b)	15	30	60	120
(c)	15	30	60	120

TEST T.

Quality: Credit.				Time: Credit only with success.			
Points	4	3	2	Points	3	2	1
(a)	Very good	Fair	Very poor.		7	15	30
(b)	do	do	do		7	15	30
(c)	do	do	do		7	15	30

TABLE 11.—*For equalizing raw scores in the individual examinations.*

[Directions: Look for the raw score, in any test, in the column at the left headed "raw score." Then look in the column headed by the test letter for the equalized score. To find a single score for an individual in the individual examination, find the average of his equalized scores and multiply by 10.]

Raw score.	Equalized scores.																			
	A	B	C	D	E	G	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
0	1	2	0	1	0	0	6	3	5	5	0	6	3	9	4	4	3	6	3	0
1	3	5	2	3	1	0	12	6	.....	.....	6	11	6	.....	9	7	7	10	6	17
2	4	8	3	3	2	0	15	7	.....	.....	7	12	7	.....	10	8	9	11	8	19
3	5	10	4	3	2	1	18	8	12	7	8	13	9	.....	11	9	13	12	11	21
4	5	12	5	4	3	1	20	9	.....	.....	10	14	11	.....	12	10	18	13	16	23
5	6	14	6	4	3	1	22	10	14	12	12	15	13	18	14	11	23	14	22	24
6	7	16	8	4	4	2	24	11	15	13	14	16	15	19	16	12	.....	15	26	25
7	7	18	10	4	4	2	26	12	16	14	17	17	18	21	17	14	.....	16	27	26
8	8	20	12	5	5	3	28	13	17	15	20	17	21	22	19	16	.....	17	28	27
9	9	21	14	5	5	3	29	14	18	.....	23	18	24	23	20	18	.....	18	30	28
10	9	22	16	5	6	4	30	15	19	16	27	18	27	24	22	20	.....	19	.....	30
11	10	23	18	6	7	4	.....	15	20	17	.....	19	30	25	25	21	.....	20	.....	.....
12	11	24	20	6	7	5	.....	16	22	18	.....	19	.....	25	28	23	.....	21	.....	.....
13	12	25	22	7	8	6	.....	16	24	19	.....	20	.....	26	.....	24	.....	22	.....	.....
14	13	26	24	7	9	7	.....	17	26	20	.....	20	.....	26	.....	25	.....	23	.....	.....
15	14	27	25	8	10	8	.....	18	28	21	.....	21	.....	27	.....	26	.....	24	.....	.....
16	14	27	26	9	11	9	.....	18	30	22	.....	22	.....	27	.....	27	.....	25	.....	.....
17	15	28	27	10	12	10	.....	19	.....	23	.....	23	.....	28	.....	28	.....	26	.....	.....
18	16	28	28	11	13	12	.....	19	.....	24	.....	24	.....	28	.....	29	.....	27	.....	.....
19	16	29	29	12	14	14	.....	20	.....	25	.....	25	.....	29	.....	30	.....	28	.....	.....
20	17	29	30	13	15	17	.....	21	.....	26	.....	26	.....	29	.....	31	.....	29	.....	.....
21	18	30	.....	14	16	23	.....	21	.....	27	.....	27	.....	29	.....	.....	.....	30	.....	.....
22	18	30	.....	15	18	.....	.....	22	.....	28	.....	28	.....	30	.....	.....	.....	.....	.....	.....
23	19	.....	.....	17	20	.....	.....	23	.....	29	.....	29	.....	.....	.....	.....	.....	.....	.....	.....
24	20	.....	.....	18	21	.....	.....	23	.....	30	.....	30	.....	.....	.....	.....	.....	.....	.....	.....
25	21	.....	.....	19	22	.....	.....	24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	22	.....	.....	20	23	.....	.....	24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	23	.....	.....	21	24	.....	.....	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	24	.....	.....	22	25	.....	.....	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
29	25	.....	.....	23	26	.....	.....	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
30	25	.....	.....	24	27	.....	.....	26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
31	26	.....	.....	25	28	.....	.....	26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
32	26	.....	.....	26	28	.....	.....	26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
33	27	.....	.....	27	29	.....	.....	27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
34	27	.....	.....	27	29	.....	.....	27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
35	28	.....	.....	28	29	.....	.....	27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
36	28	.....	.....	28	30	.....	.....	27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
37	28	.....	.....	29	.....	.....	.....	28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
38	29	.....	.....	29	.....	.....	.....	28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
39	29	.....	.....	29	.....	.....	.....	28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
40	29	.....	.....	30	.....	.....	.....	28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
41	29	.....	.....	.....	.....	.....	.....	29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
42	29	.....	.....	.....	.....	.....	.....	29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
43	30	.....	.....	.....	.....	.....	.....	29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
44	30	.....	.....	.....	.....	.....	.....	29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
45	30	.....	.....	.....	.....	.....	.....	30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
46	30	.....	.....	.....	.....	.....	.....	30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
47	30	.....	.....	.....	.....	.....	.....	30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
48	30	.....	.....	.....	.....	.....	.....	30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
49	30	.....	.....	.....	.....	.....	.....	30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
50	31	.....	.....	.....	.....	.....	.....	31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

TABLE 12.—*Showing scores obtained by certain percentages of the group of 312 unselected men.*

Percentile	0	5	10	15	20	25	30	40	50	60	70	75	80	85	90	95	100
Score attained	200	218	205	195	187	180	174	162	150	138	126	120	112	102	86	65	40

Instructions for giving and scoring the tests according to table 10:

Test A. Cube construction.—In test A any one of the five parts, (*a*), (*b*), (*c*), (*d*), or (*e*), may be concluded in one of the following three ways. Either the subject will have completed the assemblage of the blocks into the form of the model within the time limit, he will have quit and refused to try further, or he will have been told to stop because the time limit has been reached. The giving of credit for time is contingent upon the completion of the assembling.

Thus in the second and third of the above cases no credit is to be given for time; but in the first case points are given for time as follows: If, for example in (*a*), the nine blocks are assembled—

Within 120 seconds but not within 80 seconds, count 1 point (see table).
Within 80 seconds but not within 50 seconds, count 2 points.
Within 50 seconds but not within 25 seconds, count 3 points.
Within 25 seconds but not within 10 seconds, count 4 points.
Within 10 seconds, count 5 points.

No matter whether the subject finishes or not, credit is given for the degree of success attained as follows: Count each misplaced or unassembled block as three moves and add the number thus obtained to the number of moves actually made. If the total number of moves thus obtained, in (*a*), for example, is—

Not over 9 moves, count 5 points (see table).
Over 9 moves but not over 11 moves, count 4 points.
Over 11 moves but not over 15 moves, count 3 points.
Over 15 moves but not over 25 moves, count 2 points.
Over 25 moves but not over 50 moves, count 1 point.
Over 50 moves, count 0 point.

A subject completing the assemblage in 65 seconds, having made 12 actual moves and leaving 3 blocks out of place, will be scored as follows: $3\times3=9$ (moves for errors); $9+12=21$ (moves in all).

This number being less than 25, but not less than 15, 2 points are given for moves. Forty-five seconds being less than 50, but not less than 25, the subject is given 3 points for time. Five points (2+3) are therefore given for part (*a*). Parts (*b*), (*c*), (*d*), and (*e*) are scored similarly. The total number of points given for parts (*a*), (*b*), (*c*), (*d*), and (*e*) constitutes the raw score for test A. The raw scores for test A may therefore vary from 0 to 50.

The general plan of scoring time in the remaining sets, B, D, E, K. L, N, P, and T, is similar to that employed in A. Any contingency governing the giving of credit for time is given above each time schedule. The plan in each case, as in A, is to note in the table the time within which the solution is made and to give credit for the number of points indicated directly above that amount of time.

Test B. Clock test.—In any of the four parts, (*b*), (*c*), (*d*), or (*e*), if the subject has made no correct response as the time limit approaches, say, "If you are not sure of the right answer tell now what you think it is and we will go on to the next." (The object is to preclude the giving of a zero score for default when subject may have right answer in his mind but hesitates.)

Amend the directions for (*c*), (*d*), and (*e*) as follows: If subject has given a wrong answer considerably within the limit, say, "Are you sure that is right?" If subject answers in the affirmative, count the item wrong and proceed to the next. If he gives the right answer, with no further comments on the part of the examiner, count the item + and take the time to the giving of right answer.

In any one of the five items, (*a*), (*b*), (*c*), (*d*), or (*e*), the response is counted either right or wrong; if wrong give no credit for the items; if right, give credit for time as per table, *provided, however, that if subject has been questioned by examiner as noted above, one point in the score for that time is counted off.* If, for example, subject gave first an incorrect answer and upon being questioned, then gave a correct answer to item (*c*) or (*d*) or (*e*) in 25 seconds, this being within 30 seconds, but not within 15 seconds, subject should receive 2 points for time minus 1 point for suggestion—1 point for the item.

The score for test B consists of the sum of the numbers of points received for parts (*a*), (*b*), (*c*), (*d*), and (*e*), and may therefore vary from 0 to 22.

Test D. Maze test.—If, after subject has finished a maze, it appears that a line of the maze has been crossed (not due to awkwardness), examiner should say, "You have crossed a line here" (pointing to the place), "You see, that is not an open space. Begin here and see if you can find a path out without crossing any lines." Start the subject again at a point on his pencil mark just before it crosses the line of the maze. Repeat if necessary and if within the time limit. Note time only when subject has finished without crossing a line.

Test D will then be scored as follows: If subject, in a limit of 2 minutes, has reached the exit in the maze by a path which does not cross a line, give credit for time as per table.

Whether subject finishes in the time limit or not, give credit for the degree of success he has attained in the maze as follows: Consult accompanying key maze blank in which are blue arrows. (Not reproduced here. It was practically identical with the key mazes of Fig. L, page 188.) To make any turn or turns indicated by one arrow, *the first time*, without crossing any of the blue lines cutting off blind alleys, constitutes a "successful step" in the solution. The completion of five successful steps will be noted to constitute a correct solution of each maze. Each step is either successful or unsuccessful. If successful, count 1 point; if not, count 0 points. The score for accomplishment for each maze is, therefore, the number of successful steps; provided, however, that an error of crossing a line (even though correction has been made as above indicated) counts off 1 point. The score for each part (*a*), (*b*), (*c*), or (*d*), is, then, the sum of the score for time and the score for accomplishment. The total raw score for test D is the sum of the four scores for the parts. The range of this score will be seen to be from 0 to 32.

Test E. Form board. (Dearborn).—If subject fails to solve the problem in any part, (*a*), (*b*), (*c*), or (*d*), within the time limit, score the part zero. If, however, a correct solution has been accomplished within the time limit, give credit for time and for moves as shown in the table. Thus if (*a*) is solved in the time limit of 120 seconds, but not

within 70 seconds, give 1 point for time, etc. If the solution in (*a*) is accomplished in more than 7 moves, score 0 for moves; if within 7 or not within 4 moves give 1 point for moves, etc.

Test K. Letter line.—Score each part, (*a*) or (*b*), as follows: For correct solution give 6 points; if the solution is correct except for the reversal of two letters which are adjacent in the key, give 3 points. For a solution involving a greater error, give 0 points. If correct solution is given within the time limit, give credit for time as per table.

Test L. Disarranged sentences.—If the subject gives a sentence considerably within the time limit, but with an error, say, "Are you sure you have the right word?" (or, "Are you sure you used all the words?" or, "Use just the words given here"). "Look again and see." Then if subject gives a correct solution within the time limit, score the item, +s (plus after suggestion), and take time to the giving of the correct solution. Score each part of test L as follows: For failure to give a correct solution within the time limit give a score of 0 points for that part. If a correct solution is given within the time limit, give credit for time as per table and for the solution as follows: Spontaneous correct solution, 5 points. Correct solution after suggestion, 2 points.

Tesrt N. Controlled association (rimes).—Give credit for each part as follows: If no rimes are given, allow no credit for the part. If one or more rimes are given, allow credit as per table—thus: One rime, 4 points; two rimes, 5 points; three or four rimes, 6 points; five or more rimes, 7 points. For each word given which does not rime, cut off one point, provided no negative scores are given any part. If five rimes are given with no errors within the time limit, give credit for time as per table.

Test P. Ingenuity (Terman.)—Amend the directions for test P so as to impose a time limit of 2 minutes on each of the three parts, (*a*), (*b*), and (*c*), instead of allowing 5 minutes on (*b*) and (*c*). Give no credit for any part of the test that is failed. For each part correctly solved give credit for time of solution as per table.

Test T. Sentence construction.—Score each part as follows: If the three ideas are not combined so as to express a a single thought, give no credit for the part. If the three ideas are connected in a single thought, but so as to make a very poor sentence (poor in thought or ungrammatical), give 2 points. If the sentence is of medium quality (slight errors in grammar allowed) give 3 points. If very good (strictly grammatical and showing superior thought) give 4 points. If any credit is given an item for quality, credit that item also for time as per table.

SECTION 4.—*Examiner's guide, second revision.*

EXAMINER'S GUIDE
FOR
PSYCHOLOGICAL EXAMINING
IN THE ARMY.

[Prepared especially for military use by the Subcommittee on Methods of Examining Recruits of the Psychology Committee of the National Research Council. Revised by direction of the Surgeon General of the Army and printed by the Medical Department, U. S. A., September 1917. Second revision, July, 1918.]

I. INTRODUCTORY STATEMENT.

1. PURPOSES OF PSYCHOLOGICAL EXAMINATION.

(*a*) To classify soldiers according to their mental ability, thus supplementing personnel records of occupational qualifications and assisting with assignment in the Army.

(*b*) To supply a mental rating for each soldier which shall assist personnel officers in building organizations of equal or of appropriate mental strength.

(*c*) To assist regimental, company and medical officers by careful examination and report on men who are not responding satisfactorily to training, or are otherwise troublesome.

(*d*) To assist officers of development battalion with classification, grading, training, and ultimate assignment of men.

(*e*) To assist in discovering men of superior mental ability who should be selected for officers' training camps, for promotion or for assignment to special tasks.

(*f*) To assist in discovering and properly placing men of marked special skill, as for example, observers or scouts for intelligence service.

(*g*) To assist in discovering men who are mentally inferior and who in accordance with degree of defectiveness should be recommended for discharge, development battalions, labor organizations or regular military training.

2. GENERAL PLAN OF EXAMINATION.

(1) Segregation of men obviously illiterate.
(2) Group examination alpha (for literates):
  Time, 40 to 50 minutes.
  Number, 100 to 200 men in a group.
(3) Group examination beta (for illiterates and men failing in examination alpha):
  Time, 50 to 60 minutes.
  Number, up to 60 men in a group.
(4) Individual examinations (for men failing in beta, or referred):
  Point-scale examination. } Time, 15 to 60 minutes.
  Stanford-Binet examination. } Time, 15 to 60 minutes.
  Performance-scale examination. } Time, 15 to 60 minutes.
  Mechanical skill examination (supplementary). Time, 15 to 30 minutes.

The order of procedure is as follows:

(*a*) A group consisting of 100 to 200 men will report to the psychological examiner at designated room for examination alpha.

(*b*) Men who can not read and write English at all should first be eliminated from this group by directing those who can not read or write to stand, and by observing the manner in which the remainder fill out the headings of the examination alpha blank. Those who are eliminated should be sent to the special beta examining room; the remainder should be given examination alpha.

(*c*) Men found later to have made scores of less than 15 (raw score) in examination alpha should be given examination beta.

(*d*) Individuals rated D— after beta or after alpha and beta will report by appointment for individual examination. It is estimated that not over 5 per cent of the strength of an organization should require individual psychological examination.

Summary.—All enlisted men take either alpha or beta. Those who can read and write English, take alpha immediately. Those who can not, take beta immediately. Those who make scores of less than 15 in alpha take beta. All who fail in beta take individual examination. The form of individual examination given varies with the characteristics of the subject. Point Scale or Stanford-Binet examination may be given to subjects who are able to understand English fairly well. To all other subjects performance-scale examination should be given either alone or in addition to one of the other scales.

3. ORGANIZATION AND ROUTINE.

The value of these examinations will depend upon the perfection of organization and the efficiency of the routine procedure which is developed by the examining staff. The following points are especially important:

(*a*) Previous arrangement should insure the prompt reporting of men either by groups or individually at a given time and place for prescribed examination. Company officers accompanying groups to be examined should be asked to list men who give trouble, or whom they would like to see examined individually; reasons and company record should be noted in each case.

(*b*) Group and individual examination blanks should be scored and recorded as promptly as possible, and ratings prepared for immediate report. The chief psychological examiner is responsible for one complete file of all examinations, to be kept in easily accessible form by organizations. All available lists of names, such as company rosters, personnel officer lists, etc., should be used by examiners to simplify and to increase the accuracy of the reports. Time will often be saved by typing or writing scores directly on such lists, especially if they can be obtained in duplicate or triplicate.

(*c*) The intelligence rating of every man examined should be reported promptly to personnel officer, with comment concerning any special aptitude noted. Company commanders should also have all available information as soon as men are assigned.

(*d*) All cases of mental deficiency, as well as all cases for which neuro-psychiatric examination is especially indicated, should be referred promptly to the psychiatrist through the camp or division surgeon. Complete report of psychological examination, on blank furnished for the purpose, must accompany every such case, whether referred for discharge, assignment to special organization, or neuropsychiatric examination.

(*e*) Psychological record card, complete with recommendation and disposition of case, and report on cases recommended for neuro-psychiatric examination should be forwarded to the Surgeon General's Office, Division of Psychology, after the soldier has left camp.

(*f*) Weekly statistical sheet should be sent promptly on or before Tuesday of each week to Surgeon General's Office. It should be supplemented by such letter statements and special reports as seem desirable.

(*g*) Every effort should be made to cooperate as fully and effectively as possible with all officers of the camp or division for the increased efficiency of the Army.

February 2, 1918, the following instructions were issued, by the divisions concerned, to promote cooperation and increase the efficiency of the psychological and neuro-psychiatric services:

PROVISION FOR COORDINATION OF PSYCHIATRIC AND PSYCHOLOGICAL EXAMINATIONS IN DIVISIONAL TRAINING CAMPS.

It is agreed between the Division of Psychology and the Division of Neuro-psychiatry:

(1) That psychiatric survey of organizations shall be made in conjunction with psychological survey.

(2) That for this purpose psychiatric examiners shall be present at group psychological examinations, to observe the behavior and appearance of soldiers. It is further provided that the work of the psychiatrist shall not interfere with the proper conduct of psychological examination.

(3) That rooms numbered 5 and 6 in psychology building shall be designated for psychiatric examining.

(4) That the name, rank, and organization of individuals receiving grade E in group psychological examination shall be reported promptly to the division psychiatrist through the division surgeon.

(5) That report of individual psychological examination shall be accepted by psychiatrist as part of the medical examination and shall be included in the case record if subject be recommended for discharge or for special assignment.

PEARCE BAILEY,
Major, M. R. C., Chief of Division of Neuro-psychiatry.

ROBERT M. YERKES,
Major, S. C., N. A., Chief of Division of Psychology.

4. UTILIZATION OF RESULTS.

Psychological ratings should be valuable alike to personnel officers, line officers, and medical officers. To the first, as partial basis for placement of soldiers; to the second, as supplementary information for guidance in connection with training, or special treatment of men who give trouble; and to the third, as partial basis for recommendation for discharge, special examination, or medical treatment.

The results of examination should be made available to these officers as early as possible. It is therefore the duty of the psychological examiner to see that every drafted man is examined as promptly as possible after arrival in camp, and that report is immediately made to the personnel officer, to the medical officer if the case requires it, and subsequently to the company commander to whom the man is assigned.

The draft contains an adequate number of high-grade men to fill positions of responsibility. The psychological examination helps to reveal noncommissioned officer material and suitable candidates for officers' training camps. It also supplies partial basis for assignment of men to specific trades or occupations in the Army. In making selections for training in any specialized branch of military service it will probably be wise to select individuals whose intelligence scores are well above the lower quartile for the occupation in question. Apart from inequalities in experience or special training, the difference in the scores of two men will, in a general way, indicate their relative value for assignment to a specific trade or occupation.

Emphasis should be placed upon the desirability of balancing the special trades and occupations in the various companies and regiments. Each unit should have its proper share of high, medium, and low grade men for special assignments as well as for the ranks. It is evident that the ultimate value of the psychological service in balancing the units will depend very largely upon the establishment of proper cooperative relations with personnel officers. Frequent conferences with the personnel officers should be held, and ways and means considered for securing effective coordination of effort.

To be of the greatest value the psychological examination should be given at the earliest possible date after the arrival of the men in camp, in order that the personnel officer may have the results on the qualification cards when making assignments. Unless the scores are available and used properly at this time, companies will be built up that are very uneven in general intelligence. In order to balance companies and regiments satisfactorily it is necessary to observe not only the special requirements laid down in the tables of organization, but also the requirement that there shall be equivalent grades of intelligence in company organizations and in the various trades and occupations demanded in each.

Cooperative relations should be established between psychiatrists and psychological examiners in order that company commanders and personnel officers may obtain promptly detailed information concerning any individual recruit. The lower grades of mental capacity are clearly indicated by the alpha and beta examinations. The lowest cases should be given individual examination with the least possible delay. Company commanders should be encouraged to refer for examination men whose drill or conduct is unsatisfactory. Where development battalions have been formed special study should be made of the results of the development work in the case of men of various grades of intelligence. The psychological service should be able to make an effective contribution in the handling of development units.

5. CONFERENCES WITH OFFICERS.

In order that the results of examinations may be used effectively, it is necessary that psychological examiners take pains to acquaint all officers in their stations with the nature and uses of intelligence ratings. To this end, conferences with groups of officers, by regiments or other convenient unit, should be arranged by the chief psychological examiner. In these conferences the methods of examining should be explained clearly and simply, and the possible ways of using psychological information described and illustrated. The examiner should strive especially to take the military point of view. Unwarranted claims concerning the accuracy of the results should be avoided. In general, straightforward commonsense statements will be found more convincing than technical descriptions, statistical exhibits, or academic arguments.

In order to make such conferences of the greatest value, the views and criticisms of officers should be elicited as fully as possible. In this way misunderstandings will be cleared up and the way paved for effective cooperation.

The criticisms most likely to arise are the following: (1) That the score made is greatly influenced by such accidental factors as fatigue, homesickness, illness, time of day, etc. (2) That the tests do not measure real ability, but instead merely reflect the man's educational and social advantages. (3) That the score may be greatly influenced by coaching or by a repetition of the test.

While it has been well enough established that such factors as these are not present in a sufficient degree to invalidate seriously the test results, their presence can not be denied. It can hardly be claimed that the mental or physical condition of the subject and the circumstances under which the test is given have no effect upon the score. Similarly, it would be unreasonable to suppose that the result is wholly uninfluenced by educational advantages. While coaching is not likely to invalidate the results to any great extent in Army testing, it is nevertheless a factor which should be carefully guarded against by measures designed to prevent the dissemination of blanks. As regards practice effects, it has been found that the average gain in a repeated alpha examination is approximately 8 points (raw score). The P. E. of an alpha raw score is approximately 5 points. While cases will admittedly occur in which men will receive a rating on the psychological examination somewhat higher or lower than they deserve, this would occur on any method of classification that might be used. It may well be emphasized that the psychological examination furnishes for immedi-

ate use a rating of the men which in validity compares not unfavorably with ratings furnished by officers after months of acquaintance.

In using the psychological results there is a tendency to overlook the fact that they give evidence concerning but one quality important in a good soldier. The company commander should be cautioned not to neglect the importance of other qualities, such as personal appearance, energy, military experience, leadership, initiative, tact, etc. It is no criticism of the psychological rating that it fails to measure these other qualities of the soldier. All it does is to afford a reasonably reliable measure of one essential quality—i. e., general intelligence. Although there is a fairly high correlation between general intelligence and other desirable traits, like character, leadership, etc., the fact must not be overlooked that there are individuals of high intelligence who are not properly fitted to command. It has been proved quite definitely that the results of the psychological examinations are valuable when properly used. They can not, however, be made to take the place of all other criteria. Each officer should be encouraged to scrutinize the men of his command carefully in order to discover their individual differences in other traits as well as in intelligence.

Individual cases will be found in which the information of the company commander is greatly at variance with the psychological rating. In such cases one would not be warranted in making sweeping claims for the infallibility of the test results. It should be pointed out that the discrepancy may be due to the presence or absence of important traits not measured by the intelligence examination. Such cases, however, afford opportunity for the psychological examiner to make clear the value of a rating which is absolute rather than relative. The company commander will readily appreciate the fact that his own estimate is relative; that he inevitably judges his men with reference to the average in his company. For this reason in the company which in general is inferior a high man will be overestimated. Similarly, in a specially high company a low man will be underestimated. Company commanders will readily appreciate the importance of bringing to light extreme cases of unevenness in different organizations in order that such inequalities may be remedied.

II. Segregation of Illiterates.

Subjects reporting for group examination belong in one of the following classes:

(1) Men totally illiterate or unable to understand English;

(2) Men who read or write English only with difficulty;

(3) Men who read and write English readily.

Examination alpha will not measure the intelligence of the first group; it may or may not yield a reliable measure for the second group; it will measure the intelligence of the third group.

Group 1 should be given beta only; group 3 should be given alpha (but not beta unless the score earned in alpha was below D); group 2 should be given both alpha and beta in order that men making below D in alpha because of language difficulty may have opportunity to improve their scores in examination beta.

Examiners should eliminate at the outset of examination alpha all total illiterates and men who can not understand English, by ordering these to stand and to leave the alpha room. They may then be referred to examination beta. Officers' statements that men can not read and write may be used to advantage in making this separation.

After these men have been segregated and the remaining group satisfactorily placed, each man is supplied with a pencil. Then examiner should say: "We are going to pass around some papers now; don't turn any of the pages until I tell you to." Have assistant distribute alpha booklets, face up, making sure that only one is handed to each man. As soon as the booklets have been distributed examiner should continue, slowly and distinctly, pausing after each instruction to give subjects time to respond: "Now, at the top of the page before you, print your name after the word 'Name,' print your first name first, then your middle initial, if any, and then your last name. Take time to print very *plainly*."

After name has been written, say: "Put your rank in the Army after the word 'Rank,' such as private, corporal, sergeant, sergeant first class," etc. "Put your age in years after the word 'Age.'" "In the next line write your company, regiment, arm, and division." (Examiner should mention designation of these.)

"In the next line write the name of the State or country in which you were born." "If you were not born in this country, tell next the number of years you have lived in the United States." "After 'Race' write the word 'White.'" (In examining negro troops substitute the word "Negro." If there are Indians in the group, ask them to write the word "Indian." Similarly for Chinese, Japanese, Philippinos, etc.)

"In the next line after 'Occupation,' write your usual work, trade, or business (such as carpenter, grocery clerk, laborer, farmer, student)." "Next put down how much you earned a week before you entered the Amy; not how much a *day* or a *month*, but how much a *week*."

"After 'Schooling,' draw a line under the highest grade or school you attended. For example, if the highest grade you attended was the fifth grade, draw a line under Grade 5; if you attended the second year in the high school or preparatory school, draw a line under High School, Year 2, etc."

After these directions have been given, the orderlies should systematically examine the paper of each man to discover his ability to carry out the above directions. Those subjects who are unable to read and write sufficiently to fill out these headings should be commanded to stand, and on completion of preliminary survey by examiner and his assistants should be ordered to enter examining room for examination beta.

The above direction is based upon the assumption that a man who can not understand the directions given by examiner, read the words "occupation," "weekly wages," "schooling," etc., and write the necessary replies, can not do justice to himself in examination alpha.

III. Group Examination Alpha

1. PROCEDURE.

Examination alpha is to be given to all subjects who remain in the room after the elimination of illiterates. In giving the following directions examiner should speak rather slowly, distinctly, and with proper emphasis. *He should expect and demand perfect order and prompt response to commands.*

When everything is ready examiner proceeds as follows: "Attention! The purpose of this examination is to see how well you can remember, think, and carry out what you are told to do. We are not looking for crazy people. The aim is to help find out what you are best fitted to do in the Army. The grade you make in this examination will be put on your qualification card and will also go to your company commander. Some of the things you are told to do will be very easy. Some you may find hard. You are not expected to make a perfect grade, but do the very best you can.

"Now, in the Army a man often has to listen to commands and then carry them out exactly. I am going to give *you* some commands to see how well you can carry them out. Listen closely. Ask no questions. Do not watch any other man to see what *he* does.

"Look at your papers. Just below where you have been writing, there are several sets of forms—circles, triangles, and so forth. First you will be told to do something with the circles at 1, afterward with the circles at 2, and so on.

"When I call 'Attention,' stop instantly whatever you are doing and hold your pencil up—so. Don't put your pencil down to the paper until I say 'Go.' (Examiner lowers his pencil.) Listen carefully to what I say. Do just what you are told to do. As soon as you are through, pencils up. Remember, wait for the word 'Go'."

N. B.—Examiner: Give the following instructions very distinctly and at moderate speed. After giving the command "Attention," always notice carefully and have orderlies notice whether all pencils are up. Never proceed until they are. This is especially important in the beginning. Be careful to use the directions that fit the *form* of alpha booklet distributed. Be careful not to pause or to drop the voice in the course of a compound direction, e. g., in 2, before the words "and also." Raise your pencil whenever you say "Attention." Lower it promptly whenever you say "Go."

Test 1, form 5.

1. "Attention! 'Attention' always means 'Pencils up!' Look at the circles at 1. When I say 'Go' (but not before) make a cross in the first circle and also a figure 1 in the third circle.—GO!" (Allow not over 5 seconds.)

2. "Attention! Look at 2, where the circles have numbers in them. When I say 'Go' draw a line from circle 1 to circle 4 that will pass *above* circle 2 and *below* circle 3.—GO!" (Allow not over 5 seconds.)

3. "Attention! Look at the square and triangle at 3. When I say 'Go' make a cross in the space which is in the triangle but not in the square, and also make a figure 1 in the space which is in the triangle and in the square.—GO!" (Allow not over 10 seconds.)

4. "Attention! Look at 4. When I say 'Go' make a figure 1 in the space which is in the circle but not in the triangle or square, and also make a figure 2 in the space which is in the triangle and circle, but not in the square.—GO!" (Allow not over 10 seconds.)

N. B.—Examiner: In reading 5, don't pause at the word circle as if ending a sentence.

5. "Attention! Look at 5. If a machine gun can shoot more bullets a minute than a rifle, then (when I say 'Go') put a cross in the second circle; if not, draw a line *under* the word NO.—GO!" (Allow not over 10 seconds.)

6. "Attention! Look at 6. When I say 'Go' put in the second circle the right answer to the question: 'How many months has a year?' In the third circle do nothing, but in the fourth circle put any number that is a wrong answer to the question that you have just answered correctly.—GO!" (Allow not over 10 seconds.)

7. "Attention! Look at 7. When I say 'Go' *cross out* the letter just before C and also draw a line *under* the second letter before H.—GO!" (Allow not over 10 seconds.)

8. "Attention! Look at 8. Notice the three circles and the three words. When I say 'Go' make in the *first* circle the *first* letter of the *first* word; in the *second* circle the first letter of the *second* word, and in the *third* circle the *last* letter of the *third* word.—GO!" (Allow not over 10 seconds.)

9. "Attention! Look at 9. When I say 'Go' *cross out* each number that is more than 20 but less than 30.—GO!" (Allow not over 15 seconds.)

10. "Attention! Look at 10. Notice that the drawing is divided into five parts. When I say 'Go' put a 3 or a 2 in each of the two largest parts and any number between 4 and 7 in the part next in size to the smallest part.—GO!" (Allow not over 15 seconds.)

11. "Attention! Look at 11. When I say 'Go' draw a line through every even number that is not in a square, and also through every odd number that is in a square with a letter.—GO!" (Allow not over 25 seconds.)

12. "Attention! Look at 12. If 7 is more than 5, then (when I say 'Go') cross out the number 6 unless 6 is more than 8, in which case draw a line *under* the number 7.—GO !" (Allow not over 10 seconds.)

"During the rest of this examination don't turn any page forward or backward unless you are told to. Now turn over the page to test 2."

Test 1, form 6.

1. "Attention! 'Attention' always means 'Pencils up!' Look at the circles at 1. When I say 'Go' but not before, make a cross in the second circle and also a figure 1 in the third circle.—GO!" (Allow not over 5 seconds.)

2. "Attention! Look at 2, where the circles have numbers in them. When I say 'Go' draw a line from circle 2 to circle 5 that will pass *above* circle 3 and *below* circle 4.—GO!" (Allow not over 5 seconds.)

3. "Attention! Look at the square and triangle at 3. When I say 'Go' make a cross in the space which is in the square but not in the triangle, and also make a figure 1 in the space which is in the triangle and in the square.—GO!" (Allow not over 10 seconds.)

4. "Attention! Look at 4. When I say 'Go' make a figure 1 in the space which is in the triangle but not in the circle or square, and also make a figure 2 in the space which is in the square and circle, but not in the triangle.—GO!" (Allow not over 10 seconds.)

N. B.—Examiner: In reading 5, don't pause at the word circle as if ending a sentence.

5. "Attention! Look at 5. If a regiment is bigger than a company, then (when I say 'Go') put a cross in the first circle; if not, draw a line *under* the word NO.—GO!" (Allow not over 10 seconds.)

6. "Attention! Look at 6. When I say 'Go' put in the second circle the right answer to the question: 'How many months has a year?' In the fourth circle do nothing, but in the fifth circle put any number that is a wrong answer to the question that you just answered correctly.—GO!" (Allow not over 10 seconds.)

7. "Attention! Look at 7. When I say 'Go' *cross out* the letter just before D and also draw a line *under* the second letter before I.—GO!" (Allow not over 10 seconds.)

8. "Attention! Look at 8. Notice the three circles and the three words. When I say 'Go' make in the *first* circle the *last* letter of the *first* word; in the *second* circle the *last* letter of the *second* word and in the *third* circle the *third* letter of the *third* word.—GO!" (Allow not over 10 seconds.)

9. "Attention! Look at 9. When I say 'Go' *cross out* each number that is more than 30 but less than 40.—GO!" (Allow not over 15 seconds.)

10. "Attention! Look at 10. Notice that the drawing is divided into five parts. When I say 'Go' put a 3 or a 2 in each of the two smallest parts and any number between 4 and 7 in the part next in size to the largest part.—GO!" (Allow not over 15 seconds.)

11. "Attention! Look at 11. When I say 'Go' draw a line through every odd number that is not in a circle and also through every odd number that is in a circle with a letter.—GO!" (Allow not over 25 seconds.)

12. "Attention! Look at 12. If 6 is more than 4, then (when I say 'Go') cross out the number 5 unless 5 is more than 7, in which case draw a line *under* the number 6.—GO!" (Allow not over 10 seconds.)

"During the rest of this examination don't turn any page forward or backward unless you are told to. Now turn over the page to test 2."

Test 1, form 7.

1. "Attention! 'Attention!' always means 'Pencils up!' Look at the circles at 1. When I say 'Go' (but not before) make a figure 1 in the first circle and also a cross in the third circle.—GO!" (Allow not over 5 seconds.)

2. "Attention! Look at 2, where the circles have numbers in them. When I say 'Go' draw a line from circle 3 to circle 6 that will pass *above* circle 4 and below circle 5.—GO!" (Allow not over 5 seconds.)

3. "Attention! Look at the square and triangle at 3. When I say 'Go' make a figure 1 in the space which is in the triangle but not in the square, and also make a cross in the space which is in the triangle and in the square.—GO!" (Allow not over 10 seconds.)

4. "Attention! Look at 4. When I say 'Go' make a figure 1 in the space which is in the square but not in the circle or triangle, and also make a figure 2 in the space which is in the circle and triangle, but not in the square.—GO!" (Allow not over 10 seconds.)

(N. B.—Examiner: In reading 5, don't pause at the word circle as if ending a sentence.)

5. "Attention! Look at 5. If a battleship is larger than a submarine, then (when I say 'Go') put a cross in the third circle; if not, draw a line *under* the word NO.—GO!" (Allow not over 10 seconds.)

6. "Attention! Look at 6. When I say 'Go' put in the first circle the right answer to the question: 'How many months has a year?' In the third circle do nothing, but in the fourth circle put any number that is a wrong answer to the question that you just answered correctly.—GO!" (Allow not over 10 seconds.)

7. "Attention! Look at 7. When I say 'Go' *cross out* the letter just before E and also draw a line *under* the second letter before H.—GO!" (Allow not over 10 seconds.)

8. "Attention! Look at 8. Notice the three circles and the three words. When I say 'Go' make in the *first* circle the *first* letter of the *first* word; in the *second* circle the *second* letter of the *second* word, and in the *third* circle the *last* letter of the *last* word.—GO!" (Allow not over 10 seconds.)

9. "Attention! Look at 9. When I say 'Go' *cross out* each number that is more than 40 but less than 50.—GO!" (Allow not over 15 seconds.)

10. "Attention! Look at 10. Notice that the drawing is divided into five parts. When I say 'Go' put a 4 or a 5 in each of the two smallest parts and any number between 6 and 9 in the part next in size to the largest part.—GO!" (Allow not over 15 seconds.)

11. "Attention! Look at 11. When I say 'Go' draw a line through every even number that is not in a circle and also through every odd number that is in a circle with a letter.—GO!" (Allow not over 25 seconds.)

12. "Attention! Look at 12. If 5 is more than 3, then (when I say 'Go') cross out the number 4 unless 4 is more than 6, in which case draw a line *under* the number 5.—GO!" (Allow not over 10 seconds.)

"During the rest of this examination don't turn any page forward or backward unless you are told to. Now turn over the page to test 2."

Test 1, form 8.

1. "Attention! 'Attention' always means 'Pencils up!' Look at the circles at 1. When I say 'Go' (but not before) make a figure 2 in the second circle and also a cross in the third circle.—GO!" (Allow not over 5 seconds.)

2. "Attention! Look at 2, where the circles have numbers in them. When I say 'Go' draw a line from circle 1 to circle 4 that will pass *below* circle 2 and *above* circle 3.—GO!" (Allow not over 5 seconds.)

3. "Attention! Look at the square and triangle at 3. When I say 'Go' make a figure 1 in the space which is in the square but not in the triangle, and also make a cross in the space which is in the triangle and in the square.—GO!" (Allow not over 10 seconds.)

4. "Attention! Look at 4. When I say 'Go' make a figure 2 in the space which is in the circle but not in the triangle or square, and also make a figure 3 in the space which is in the triangle and circle, but not in the square.—GO!" (Allow not over 10 seconds.)

(N. B.—Examiner: In reading 5, don't pause at the word circle as if ending a sentence.)

5. "Attention! Look at 5. If taps sound in the evening, then (when I say 'Go') put a cross in the first circle; if not, draw a line *under* the word NO.—GO!" (Allow not over 10 seconds.)

6. "Attention! Look at 6. When I say 'Go' put in the first circle the right answer to the question: 'How many months has a year?' In the second circle do nothing, but in the fifth circle put any number that is a wrong answer to the question that you just answered correctly.—GO!" (Allow not over 10 seconds.)

7. "Attention! Look at 7. When I say 'Go' *cross out* the letter just after F and also draw a line *under* the second letter after I.—GO!" (Allow not over 10 seconds.)

8. "Attention! Look at 8. Notice the three circles and the three words. When I say 'Go' make in the *first* circle the *last* letter of the *first* word; in the *second* circle the *middle* letter of the *second* word and in the *third* circle the *first* letter of the *third* word.—GO!" (Allow not over 10 seconds.)

9. "Attention! Look at 9. When I say 'Go' *cross out* each number that is more than 50 but less than 60.—GO!" (Allow not over 15 seconds.)

10. "Attention! Look at 10. Notice that the drawing is divided into five parts. When I say 'Go' put a 4 or a 5 in each of the two largest parts and any number between 6 and 9 in the part next in size to the smallest part.—GO!" (Allow not over 15 seconds.)

11. "Attention! Look at 11. When I say 'Go' draw a line through every odd number that is not in a square, and also through every odd number that is in a square with a letter.—GO!" (Allow not over 25 seconds.)

12. "Attention! Look at 12. If 4 is more than 2, then (when I say 'Go') cross out the number 3 unless 3 is more than 5, in which case draw a line *under* the number 4.—GO!" (Allow not over 10 seconds.)

"During the rest of this examination don't turn any page forward or backward unless you are told to. Now turn over the page to test 2."

Test 1, form 9.

1. "Attention! 'Attention' always means 'Pencils up!' Look at the circles at 1. When I say 'Go,' but not before, make a cross in the first circle and also a figure 1 in the last circle.—GO!" (Allow not over 5 seconds.)

2. "Attention! Look at 2, where the circles have numbers in them. When I say 'Go' draw a line from circle 2 to circle 5 that will pass *below* circle 3 and *above* circle 4.—GO"! (Allow not over 5 seconds.)

3. "Attention! Look at the square and triangle at 3. When I say 'Go' make a figure 2 in the space which is in the triangle but not in the square, and also make a figure 3 in the space which is in the square and in the triangle.—GO!" (Allow not over 10 seconds.)

4. "Attention! Look at 4. When I say 'Go' make a figure 2 in the space which is in the triangle but not in the circle or square, and also make a figure 3 in the space which is in the square and circle, but not in the triangle.—GO!" (Allow not over 10 seconds.)

(N. B.—Examiner: In reading 5, don't pause at the word circle as if ending a sentence.)

5. "Attention! Look at 5. If a captain is superior to a corporal, then (when I say "Go') put a cross in the second circle; if not, draw a line *under* the word NO.—GO!" (Allow not over 10 seconds.)

6. "Attention! Look at 6. When I say 'Go' put in the third circle the right answer to the question: 'How many months has a year?' In the fourth circle do nothing, but in the fifth circle put any number that is a wrong answer to the question that you just answered correctly.—GO!" (Allow not over 10 seconds.)

7. "Attention! Look at 7. When I say 'Go' *cross out* the letter just after G and also draw a line *under* the second latter after H.—GO!" (Allow not over 10 seconds.)

8. "Attention! Look at 8. Notice the three circles and the three words. When I say 'Go' make in the *first* circle the *third* letter of the *first* word; in the *second* circle the *first* letter of the *second* word, and in the *third* circle the *first* letter of the *third* word.—GO!" (Allow not over 10 seconds.)

9. "Attention! Look at 9. When I say 'Go' *cross out* each number that is more than 60 but less than 70.—GO!" (Allow not over 15 seconds.)

10. "Attention! Look at 10. Notice that the drawing is divided into five parts. When I say 'Go' put a 2 or a 3 in each of the two largest parts and any number between 6 and 9 in the part next in size to the smallest part.—GO!" (Allow not over 15 seconds.)

11. "Attention! Look at 11. When I say 'Go' draw a line through every even number that is not in the square, and also through every odd number that is in a square with a letter.—GO!" (Allow not over 25 seconds.)

12. "Attention! Look at 12. If 3 is more than 1, then (when I say 'Go') cross out the number 2 unless 2 is more than 4, in which case draw a line *under* the number 3.—GO!" (Allow not over 10 seconds.)

"During the rest of this examination don't turn any page forward or backward unless you are told to. Now turn over the page to test 2."

Test 2, arithmetical problems.

"Attention! Look at the directions at the top of the page while I read them. 'Get the answers to these examples as quickly as you can. Use the side of this page to figure on if you need to.' I will say stop at the end of five minutes. You may not be able to finish all of them, but do as many as you can in the time allowed. The two samples are already answered correctly.—Ready—GO!"

After 5 minutes, say "STOP! Turn over the page to test 3."

Test 3, practical judgment.

"Attention! Look at the directions at the top of the page while I read them.

"'This is a test of common sense. Below are sixteen questions. Three answers are given to each question. You are to look at the answers carefully; then make a cross in the square before the *best* answer to each question, as in the sample:

"Why do we use stoves? Because

☐ they look well

☒ they keep us warm

☐ they are black

"Here the second answer is the best one and is marked with a cross.

"Begin with No. 1 and keep on until time is called.'—Ready—GO!" After 1½ minutes, say "STOP! Turn over the page to test 4."

Test 4, synonym—antonym.

"Attention! Look at the directions at the top of the page while I read them." (Examiner reads slowly.)

"'If the two words of a pair mean the same or nearly the same, draw a line under *same*. If they mean the opposite or nearly the opposite, draw a line under *opposite*. If you can not be sure, guess. The two samples are already marked as they should be.'—Ready—GO!"

After 1½ minutes, say "STOP! Turn over the page to test 5." (Pause.) "Now you have to turn your books around this way." (Examiner illustrates the necessary rotation.)

Test 5, disarranged sentences.

"Attention! Look at the directions at the top of the page while I read them." (Examiner reads slowly.)

"'The words *a eats cow grass* in that order are mixed up and don't make a sentence; but they would make a sentence if put in the right order: *a cow eats grass*, and this statement is true.

"Again, the words *horses feathers have all* would make a sentence if put in the order *all horses have feathers*, but this statement is false.

"Below are 24 mixed sentences. Some of them are true and some are false. When I say 'Go,' take these sentences one at a time. Think what each *would* say if the words were straightened out, but don't write them yourself. Then, if what it *would* say is true draw a line under the word 'true;' if what it would say is false, draw a line under the word 'false.' If you can not be sure, guess. The two samples are already marked as they should be. Begin with No. 1 and work right down the page until time is called.'—Ready—GO!"

After 2 minutes, say "STOP! Turn over the page to test 6."

Test 6, number series completion.

(N. B.—Examiner: Give these instructions very slowly.)

"Attention! Look at the first sample row of figures at the top of the page—2, 4, 6, 8, 10, 12; the two numbers that should come next are, of course, 14, 16.

"Look at the second sample—9, 8, 7, 6, 5, 4: the two numbers that should come next are 3, 2.

"Look at the third sample—2, 2, 3, 3, 4, 4; the two numbers that should come next are 5, 5.

"Now look at the fourth sample—1, 7, 2, 7, 3, 7; the next two numbers would, of course, be 4, 7.

"Look at each row of numbers below, and on the two dotted lines write the two numbers that should come next.—Ready—GO!"

After 3 minutes, say "STOP! Turn over the page to test 7."

Test 7, analogies.

"Attention! Look at the first sample at the top of the page: Sky—blue : : grass—table, *green*, warm, big.

"Notice the four words in heavy type. One of them—*green*—is underlined. Grass is *green* just as the sky is blue.

"Look at the second sample: Fish—swims : : man—paper, time, *walks*, girl.

"Here the word *walks* is underlined. A man walks and a fish swims.

"Look at the third sample: Day—night : : white—red, *black*, clear, pure.

"Here the word *black* is underlined because black is the opposite of white just as night is the opposite of day.

"In each of the lines below the first two words are related to each other in some way. What you are to do in each line is to see what the relation is between the first two words, and underline the word in heavy type that is related in the same way to the third word. Begin with No. 1 and mark as many sets as you can before time is called.—Ready—GO!"

After 3 minutes, say "STOP! Turn over the page to test 8."

Test 8, information.

"Attention! Look at the directions at the top of the page while I read them." (Examiner reads slowly.)

" 'Notice the sample sentence: People hear with the—eyes—ears—nose—mouth. The correct word is *ears*, because it makes the truest sentence. In each of the sentences below you have four choices for the last word. Only one of them is correct. In each sentence draw a line under the one of these four words which makes the truest sentence. If you can not be sure, guess. The two samples are already marked as they should be.'—Ready—GO!"

After 4 minutes, say "STOP! Turn over the page to test 1 again. In the upper right hand corner, where it says 'Group No. —,' put the number 101" (or 102, 103, etc., according to the number of this group in the examiner's series of groups).

Have all examination booklets and pencils collected immediately and before the men are allowed to leave their seats. Before dismissing the group, the number of booklets collected should be carefully checked with the number of men present and the number of booklets issued.

2. DIRECTIONS FOR SCORING.

General rules.

1. Each item is scored either right or wrong. No part credits are given.
2. In general, items evidently corrected stand as corrected.
3. In tests where the score is " number right," only wrong items need be checked in scoring. In tests 4 and 5, where the score is "right minus wrong," wrong and omitted items must be separately checked.
4. Indicate the last item attempted by drawing a long line under that item and out into the margin.
5. Enter the score for each test in lower right-hand corner of the test page and encircle it. When the test has been re-scored, a check mark (✓) may be made beside the circle.
6. Red or blue pencil increases accuracy of scoring.

Test 1.

(Score is number right.)

1. No credit is given for any item in which *more* is done than the instructions require.
2. In an item where something is to be written "*in*" a given space, give credit if a mark crosses a line from haste or awkwardness; give no credit if the position is really ambiguous.
3. Where something is to be underlined or crossed out, give credit if two or three underlinings are made in the required place, and give credit for any method of crossing out.
4. *Item 2.*—The pencil line must begin and end either on the circumference or within the circles indicated. It may touch the intermediate circles, but must not cut through them.
5. *Item 6.*—In the circle marked "not 12" there must be some number which is not 12, such as 5, 0, 27.
6. *Item 9.*—The proper numbers must be crossed out to receive credit.
7. *Item 10.*—In Form 5, "2" alone and "3" alone, but not "2 or 3," in each of the two largest parts; "5" alone and "6" alone, but not "5 or 6," in the next to the smallest part, are correct. Similarly for other forms.
8. *Item 11.*—The lines must cross, or at least touch, the proper numbers; they may or may not cut the accompanying letters. Mere indications of the square, triangle, etc., is not sufficient.
9. *Item 12.*—Underlining in place of crossing out is wrong.

Test 2.

(Score is number right.)

1. Answer may be written on dotted line or elsewhere near its problem.
2. If two answers are given to any problem, count as wrong.
3. If it seems clear that, by a slip, one answer has been put in the wrong brackets, and the next answers are all thus misplaced, give credit for the answers that are right even if misplaced.
4. Omission of dollar sign is permissible.
5. Omission of decimal point is permissible in items 2, 9, 13, and 14. Fraction may be expressed as decimal in item 15.

Test 3.

(Score is number right.)

1. Any clear method of indicating answer is given full credit—underlining, checking, etc.
2. If two answers are marked, count as wrong unless one is clearly indicated as final.

Test 4.

(Score is number right minus number wrong.)

1. Any clear method of indicating answer is given credit.
2. When both "same" and "opposite" are underlined, counts as *omitted*, not as wrong.
3. If only "same" is underlined right down the column, score for the test is zero. Similarly if "opposite" is underlined right down the column.

Test 5.

(Score is number right minus number wrong.)

Same rules as for test 4.

Test 6.

(Score is number right.)

1. If only one number is written, give no credit.
2. If only one of the numbers is right, give no credit.
3. If four numbers are written, as frequently happens with certain items (i. e., 33, 11 instead of 3, 3), give full credit.

Test 7.

(Score is number right.)

1. Any clear indication other than underlining receives full credit.
2. Underlining of any of the first three words of an item does not remove credit.
3. If two or more of the last four words are marked, give no credit.

Test 8.

(Score is number right.)

Same rules as for test 7.

3. TOTAL SCORE AND RATING.

The result of examination alpha is expressed in a total score which is the sum of the raw scores of the several tests. The raw scores are obtained as follows:

Test.	Method of scoring.	Maximum raw score.
1	R	12
2	R	20
3	R	16
4	R-W	40
5	R-W	24
6	R	20
7	R	40
8	R	40
Total		212

Letter ratings are assigned on examination alpha as follows:

Rating.	Score.
A	135–212
B	105–134
C+	75–104
C	45– 74
C−	25– 44
D	15– 24
D−[1]	0– 14

[1] Recalled for further examination.

All ratings above D− are entered and reported at once. Men whose scores are below D are recalled for examination beta. Ratings of D− may not be given in alpha, unless recall of the men for beta is impossible.

IV. GROUP EXAMINATION BETA.

1. DIRECTIONS FOR SETTING UP APPARATUS.

Beta materials are shipped in three packages.

1. Blackboard frame.
2. Blackboard chart.
3. (*a*) Cardboard pieces for test 7; (*b*) patterns for constructing cubes for test 2.

The *blackboard frame* consists of 8 fitted sections, 2 uprights which carry 2 rollers and 4 crossbars which are attached to the small crosspieces of the uprights The blackboard should be set up so that the ends of the rollers to which the crank may be fitted come on the right-hand side. A piece of beaver board 30 by 40 inches should be nailed to the crossbars so as to give a rigid writing surface. This must be procured in the camps.

The *blackboard chart* is a continuous roll 27 feet long. Care should be used in attaching chart to rollers so that it will wind evenly. The chart must be kept as clean as possible at all times. The painting should be gone over from time to time with a white gloss paint.

The *patterns for constructing cubes for test 2* should be drawn on heavy cardboard on a scale such that the constructed model will appear to be made from 3-inch cubes. All cube edges, either real or imaginary, should be bordered in lines ⅛-inch thick painted with india ink. The models should be cut on the full lines and folded on the dotted lines as indicated in the patterns furnished. For these cube models a sloping shelf should be so arranged that the perspective from the center of the room will be the same as that of the models represented on the blackboard.

Chalk, eraser, pointer, and a curtain for covering beta apparatus are also necessary.

2. PROCEDURE.

It is most important that examination beta be given in a genial manner. The subjects who take this examination sometimes sulk and refuse to work. Examiner and his assistants will find it necessary to fill out most of the headings for the men before the examination begins. The time required for this preparatory work may be used to advantage in making the men feel at ease. As the demonstration preparatory to each test requires some time, the "pencils up" command is omitted in examination beta. The examiner's platform should be so high that he can readily see whether or not the subjects are working. Great care should be taken to prevent the overanxious from beginning work before the command "Go."

Seating conditions should be such that subjects can not copy from one another and the rule that copying shall not be allowed should be enforced strictly. The blackboard should at all times be kept clean so that the visual conditions may be excellent and constant. The blackboard figures for test 1 should be exposed when the subjects enter the examining room. *As soon as a test has been demonstrated and the men have been told to go ahead, the blackboard should be covered and kept covered until time is called.* It should not be turned to the next test until the men have been ordered to stop work on a given test. Care should be taken to have the physical conditions of examination reasonably uniform.

With the exception of the brief introductory statements and a few orders, instructions are to be given throughout by means of gestures instead of words. These gestures accompany the samples and demonstrations and should be animated and emphatic.

It is absolutely necessary that directions be followed closely and procedure kept uniform and definite. Variations of procedure are more likely to occur in beta than in alpha, and there is serious risk that if allowed they will lessen the value of results. Examiner should especially guard against using more or fewer gestures or words for one group than for another. Oral language should be rigidly limited to the words and phrases given in the procedure for the different tests.

Whether the men get the idea of the test and enter into it with the proper spirit will depend chiefly on the skill with which the examiner, the demonstrator, and the orderlies carry out their respective parts. Examiner and demonstrator especially should be selected with the greatest care. An examiner who succeeds admirably in giving alpha may prove to be entirely unadapted for beta. Both examiner and demonstrator must be adept in the use of gesture language. In the selection of a demonstrator the personnel office should be consulted. One camp has had great success with a "window seller" as demonstrator. Actors should also be considered for the work. The orderlies should be able to keep the subjects at work without antagonizing them and to keep them encouraged without actually helping them.

The demonstrator should have the single task of doing before the group just what the group is later to do with the examination blanks. The blackboard is his beta blank. Before examination beta can be given satisfactorily the demonstrator must be letter perfect in his part. Both examiner and demonstrator must be very careful to stand at the side of the blackboard in order not to hide the drawings.

As soon as the men of a group have been properly seated, pencils should be distributed and also examination blanks with test 8 up. While this is being done examiner should say "Here are some papers. You must not open them or turn them over until you are told to." Holding up beta blank, examiner continues:

"In the place where it says name, write your name; print it if you can. (Pause.) Fill out the rest of the blank about your age, schooling, etc., as well as you can. If you have any trouble we will help you." (The instructions given under segregation may be used for filling out the beta blank.) Examiner should announce the group number and see that it as well as the other necessary information is supplied. Before the examination proceeds each paper should be inspected in order to make sure that it is satisfactorily completed.

After the initial information has been obtained, examiner makes the following introductory remarks:

"*Attention.* Watch *this* man (pointing to demonstrator). *He* (pointing to demonstrator again) is going to do *here* (tapping blackboard with pointer), what *you* (pointing to different members of group) are to do on your *papers* (here examiner points to several papers that lie before men in the group, picks up one, holds it next to the blackboard, returns the paper, points to demonstrator and the blackboard in succession, then to the men and their papers). Ask *no questions. Wait* till I say 'Go ahead!'"

In general, when instructing the group to turn from test to test, examiner holds up a beta blank before group and follows his own instructions as he gives them. As soon as he has turned to desired test or page he says, "This is test X *here;* look!" (pointing to the page).

To suggest to the group the necessity of working rapidly the demonstrator, after proceeding very deliberately with the early samples of each test, hurries, as soon as he has worked out the last sample problem

(1) to record his response as fast as he can,

(2) then to catch examiner's eyes for approval, and,

(3) finally, to slip away from blackboard, drawing curtain as he does so.

After the personal data called for on page 1 of blank have been gathered and recorded, the orderlies' vocabulary in beta is rigidly restricted to the following words, or their literal equivalents in Italian, Russian, etc.: *Yes, No, Sure, Good, Quick, How many? Same, Fix it.* Under no circumstances may substitutional explanations or directions be given.

Test 1, maze.

"Now turn your papers over. This is test 1 *here* (pointing to page of record blank). Look." After all have found the page, examiner continues, "Don't make any marks till I say 'Go ahead.' Now *watch.*" After touching both arrows, examiner traces through first maze with pointer and then motions the demonstrator to go ahead. Demonstrator traces path through first maze *with crayon*, slowly and hesitatingly. Examiner then traces second maze and motions to demonstrator to go ahead. Demonstrator makes one mistake by going into the blind alley at upper left-hand corner of maze. Examiner apparently does not notice what demonstrator is doing until he crosses line at end of alley; then examiner shakes his head vigorously, says "No—no," takes demonstrator's hand and traces back to the place where he may start right again. Demonstrator traces rest of maze so as to indicate an attempt at haste, hesitating only at ambiguous points. Examiner says "Good." Then holding up blank, "Look here," and draws an imaginary line across the page from left to right for every maze on the page. Then, "All right. Go ahead. Do it (pointing to men and then to books). Hurry up." The idea of working fast must be impressed on the men during the maze test. Examiner and orderlies walk around the room, motioning to men who are not working, and saying, "Do it, do it, hurry up, quick." At the end of 2 minutes examiner says, "Stop! Turn over the page to test 2."

Test 2, cube analysis.

"This is test 2 *here.* Look." After everyone has found the page—"Now watch." The order of procedure is as follows:

(1) Examiner points to the three-cube model on the blackboard, making a rotary movement of the pointer to embrace the entire picture.

(2) With similar motion he points to the three-cube model on shelf.

(3) Examiner points next to picture on blackboard and asks, "How much?"

(4) Examiner turns to cube model and counts aloud, putting up his fingers while so doing, and encouraging the men to count with him.

(5) Examiner tabs each cube on the blackboard and motions to demonstrator, asking him "How much?"

(6) Demonstrator (pointing) counts cubes on blackboard silently and writes the figure 3 in proper place.

In the second sample of this test, when examiner counts cubes of model he

(1) counts the three exposed cubes;

(2) touches the unexposed cube with pointer; and

(3) without removing pointer turns model, so that hidden cube comes into view of group. In other respects procedure with second and third samples is the same as with first.

In counting the 12-cube model, examiner (1) counts the top row of cubes in the model (left to right), (2) counts the exposed bottom row (right to left), (3) taps with pointer the end cube of hidden row, (4) turns the entire model around and completes his counting. Examiner then holds model in same plane as drawing and counts (in the same order as above) the cubes on blackboard, counting lines between front and top row as representing the hidden row. He then asks demonstrator "How much?" Demonstrator counts the cubes on blackboard (pointing but not speaking) and writes the response.

Throughout the demonstration the counting is done deliberately, not more rapidly than one cube per second.

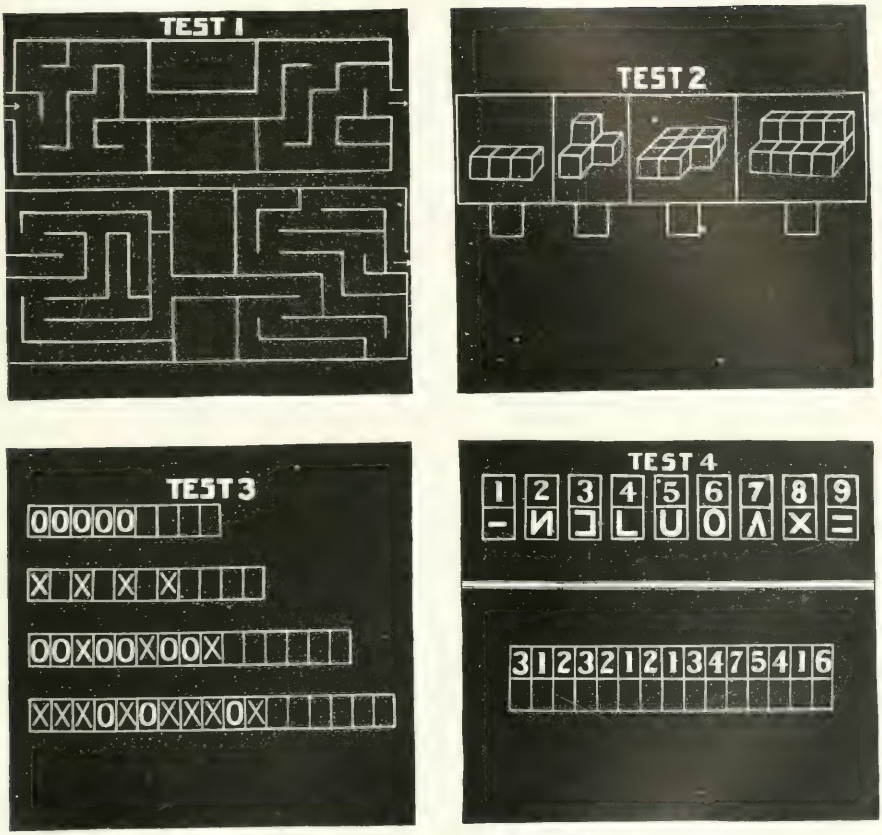
At end of demonstration examiner points to page and says, "All right. Go ahead." At the end of 2½ minutes he says, "Stop! Look at me and don't turn the page."

Test 3, X–O series.

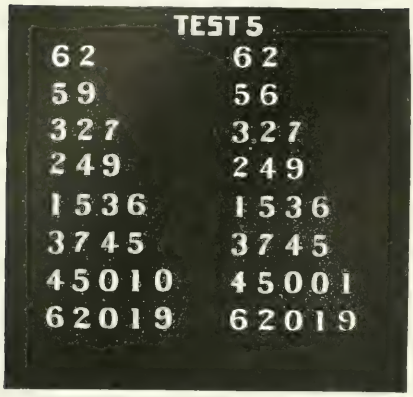
"This is test 3 *here.* Look." After everyone has found the page—"Now watch." Examiner first points to the blank rectangles at the end, then traces each "O" in chart, then traces outline of "O's" in remaining spaces. Demonstrator, at a gesture, draws them in. Examiner then traces first "X" in next sample, moves to next "X" by tracing the arc of an imaginary semicircle joining the two, and in the same manner traces each "X," moving over an arc to the next. He then traces outlines of "X's" in the proper blank spaces, moving over the imaginary arc in each case, and motions to demonstrator to draw them in. Demonstrator, at a gesture, fills in remaining problems very slowly, standing well to the right of the blackboard and writing with his left hand. Examiner points to page and says, "All right. Go ahead. Hurry up!" At end of 1¾ minutes he says, "Stop! Turn over the page to test 4."

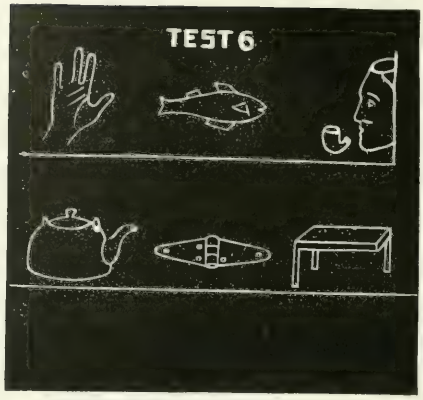
Test 4, digit–symbol.

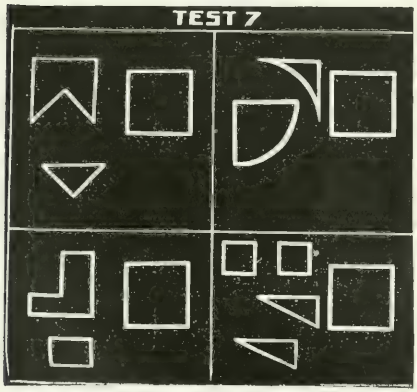
"This is test 4 *here.* Look." After everyone has found the page— "Now watch." Examiner points to first digit of key on blackboard and then points to the symbol under it. Same for all nine digits in key. Examiner then (1) points to first digit of sample, (2) to the empty space below digit, (3) points to corresponding digit of key, (4) points to proper symbol under digit in key, and (5) traces the outline of the proper symbol in the blank space under the digit in the sample. Same for first five samples. Demonstrator, at a gesture, fills in all the samples, working as follows: (1) Touches the number in the first sample with index finger of right hand; (2) holding finger there, finds with index finger of left hand the corresponding number in key; (3) drops index finger of left hand to symbol for number found; (4) holding left hand in this position writes appropriate symbol in the lower half of the sample.

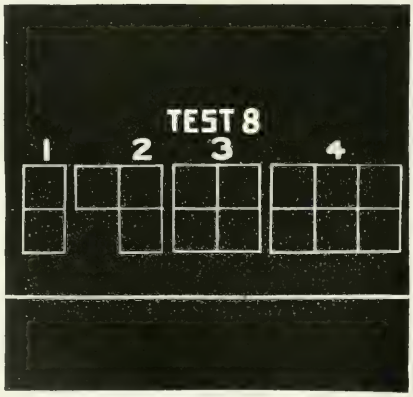


GROUP EXAMINATION BETA, BLACKBOARD DEMONSTRATIONS, TESTS 1 TO 4.









GROUP EXAMINATION BETA, BLACKBOARD DEMONSTRATIONS, TESTS 5 TO 8.

Similarly with the other samples. While working, demonstrator should stand as far as possible to the left, doing all the samples from this side.

At the end of the demonstration examiner says, "Look here!" and points to key on page, repeating the gestures used in pointing on the blackboard at the beginning of the demonstration. Then, "All right. Go ahead. Hurry up!" Orderlies point out key to men who are at a loss to find it. At the end of two minutes, examiner says, "Stop! But don't turn the page."

Test 5, number checking.

"This is test 5 *here*. Look." After everyone has found the page, "Now watch." In this demonstration examiner must try to get "Yes" or "No" responses from the group. If the wrong response is volunteered by the group, examiner points to digits again and gives right response, "Yes" or "No" as the case may be. Examiner points to first digit of first number in left column, then to first digit, first number, in right column, then to second digit, first number, in left column and second digit, first number, in right column, nods head, says "Yes" and makes an imaginary cross at end number in right column. Motions to demonstrator, who makes an "X" there. Examiner does the same for second line of figures, but here he indicates clearly by shaking head and saying "No"—that certain digits are not identical. Examiner repeats for three more sets and after each, looks at group, says, "Yes?" in questioning tone and waits for them to say "Yes" or "No." He repeats correct reply with satisfaction. Demonstrator checks each after group has responded, or at signal from examiner if group does not respond. Demonstrator then works out remaining items, pointing from column to column and working deliberately. Examiner summarizes demonstrator's work by pointing to the whole numbers in each set and saying "Yes" (indicating X) or "No;" if "No," he shows again where numbers are unlike. Examiner then points to page and says "All right. Go ahead. Hurry up!" At the end of 3 minutes examiner says "Stop. Turn over the page to test 6."

Test 6, pictorial completion.

"This is test 6 *here*. Look. A lot of pictures." After everyone has found the place, "Now watch." Examiner points to hand and says to demonstrator, "Fix it." Demonstrator does nothing, but looks puzzled. Examiner points to the picture of the hand, and then to the place where the finger is missing and says to demonstrator, "Fix it; fix it." Demonstrator then draws in finger. Examiner says, "That's right." Examiner then points to fish and place for eye and says, "Fix it." After demonstrator has drawn missing eye, examiner points to each of the four remaining drawings and says, "Fix them all." Demonstrator works samples out slowly and with apparent effort. When the samples are finished examiner says, "All right. Go ahead. Hurry up!" During the course of this test the orderlies walk around the room and locate individuals who are doing nothing, point to their pages and say, "Fix it. Fix them," trying to set everyone working. At the end of 3 minutes examiner says, "Stop! But don't turn over the page."

Test 7, geometrical construction.

"This is test 7 *here*. Look." After everyone has found the page, "Now watch." Examiner points to the first figure on blackboard. He then takes the two pieces of cardboard, fits them on to the similar drawings on blackboard to show that they correspond and puts them together in the square on blackboard to show that they fill it. Then, after running his finger over the line of intersection of the parts, examiner removes the pieces and signals the demonstrator, who draws solution in the square on blackboard. The same procedure is repeated for the second and third sample. Demonstrator works out fourth sample, after much study, pointing from the square to the forms.

Demonstrator first draws two small squares in the upper half of the large square, then the two triangles in the remaining rectangle. Each small figure is drawn in by tracing its entire circumference, not merely the necessary dividing lines. While drawing each small figure in the large square, demonstrator points with index finger of left hand to the corresponding small figure at left of square, taking care not to obstruct the view. At the end of the demonstration examiner holds up blank, points to each square on the page and says, "All right. Go ahead. Hurry up!" At the end of 2½ minutes, "Stop! Turn over the page." Papers are then collected immediately.

3. DIRECTIONS FOR SCORING.

General rules.

1. In general, items evidently corrected stand as corrected. The only exception to this rule is in the maze test.
2. In tests where the score is number right, only wrong items need be checked in scoring. In test 5, where the score is right minus wrong, wrong and omitted items must be separately checked.
3. Enter the score for each test in lower right-hand corner of the test page and encircle it. When the test has been rescored a check may be made beside the circle.
4. Red or blue pencil increases accuracy of scoring.

Test 1.

1. One-half point for each correctly completed half of maze. A half maze is correct if drawn line does not cross any line of maze (except through awkwardness) nor an imaginary straight line across the opening of a wrong passage.
2. Allow much leeway in the cutting of corners.
3. Spur running into any blind passage counts wrong for that half-item, even though erased.
4. When two lines are drawn, one straight across the page, the other correct, full credit is given.

Test 2.

Score is number right.

Test 3.

1. Score is number right.
2. Any incomplete item receives no credit.
3. Count any item correct if intended plan is carried out. Disregard additional unnecessary marks, such as circles between the crosses of items 2 and 4 in first part of line, etc.

Test 4.

1. Score is one-third of number of correct symbols.
2. Use leniency in judging form of symbol.
3. Credit symbol for 2 even though reversed.

Test 5.

1. Score is right minus wrong (number of items checked that should be checked minus number of items checked that should not be checked).
2. If other clear indication is used instead of crosses, give credit.
3. If numbers which should not be checked are marked by some other sign than is used to check similar pairs, count as though not marked.
4. If all items are checked, the score for the test is zero.

Test 6.

1. Score is number right.
2. Allow much awkwardness in drawing. Writing in name of missing part or any way of indicating it receives credit, if idea is clear.
3. Additional parts do not make item wrong, if proper missing part is also inserted.
4. Rules for individual items:

Item 4.—Any spoon at any angle *in right hand* receives credit. Left hand, or unattached spoon, no credit.
Item 5.—Chimney must be in right place. No credit for smoke.
Item 6.—Another ear on same side as first receives no credit.
Item 8.—Plain square, cross, etc., in proper location for stamp, receives credit.
Item 10.—Missing part is the rivet. Line of "ear" may b omitted.
Item 13.—Missing part is leg.
Item 15.—Ball should be drawn in hand of man. If represented in hand of woman, or in motion, no credit.
Item 16.—Single line indicating net receives credit.
Item 18.—Any representation intended for horn, pointing in any direction, receives credit.
Item 19.—Hand and powder puff must be put on proper side.
Item 20.—Diamond is the missing part. Failure to complete hilt on sword is not an error.

Test 7.

1. Score is number right.
2. Allow considerable awkwardness in drawing.
3. Extra subdivisions, if not erased, make item wrong.
4. Rules for individual items.

Item 1.—Line of division may be slightly distant from true center, and need not be straight.
Item 3.—Lines of semicircumference must start from or near corners of square.
Item 4.—Line must not start from corner.

4. TOTAL SCORE AND RATING.

The result of examination beta is expressed as a "total score," which is the sum of the raw scores of the several tests. The raw scores are obtained as follows:

Test.	Method of scoring.	Maximum score.
1	Half point for each half maze	5
2	Number right	16
3	Number right	12
4	One-third of number right	30
5	Right minus wrong	25
6	Number right	20
7	Number right	10
Total		118

Letter ratings are assigned on examination beta as follows:

Rating.	Scores.
A	100–118
B	90– 99
C+	80– 89
C	65– 79
C−	45– 64
D	20– 44
D−[1]	0– 19

[1] Recalled for individual examination.

All ratings above D− are entered and reported at once. Men whose scores fall below D are recalled for individual examination.

Ratings of D− may not be given in examination beta, unless recall of the men for individual examination is impossible.

V. Individual Examinations.

1. General directions.

Purpose.—The main purpose of the individual examination is to secure a more accurate measurement of the mental ability of those who have made D− in alpha or beta, or in both. By the personal contact it allows it should also yield valuable supplementary information of a kind which can not be brought out by a group examination. All the kinds of information secured should be considered in connection with recommendation concerning a man.

The subjects.—Men who are likely to be summoned for individual examination fall into three classes—*literates*, *illiterates*, and *non-English speaking*. Since the procedure of examination varies importantly with the class, the first task of the examiner is to assign the man who has reported for individual examination to his proper category. The following definitions will assist in the process of classifying:

Literates.—Those who have been allowed to take alpha may ordinarily be considered literate for purpose of individual examination. Subjects who have not taken alpha may be considered literate if they have completed the third grade (or its equivalent) in an American school. Examiner should question subject regarding his opportunities for schooling, and if necessary may test his ability to read and write English.

Illiterates are those who do not meet the above requirements, but who understand and speak English fairly well. The subject may be highly literate in some language but illiterate in English. Such are to be classed as illiterate for the present purpose.

Non-English-speaking subjects are those who, whether foreign born or American born, are unable to understand or speak English sufficiently well to take an oral examination given in English. The majority of such subjects are foreigners, but many foreigners belong in either the literate or the illiterate class instead of in the non-English speaking.

Choice of examination.—*Literates* should be examined by means of the Point Scale or Stanford-Binet scale according to availability of materials and preference of the examiner. Usually it will not be necessary to give a literate subject further examination, but if the examiner is in doubt as to proper rating and recommendation concerning subject, he should, after completing examination by the one or the other of these scales, supplement his observations by giving such performance tests as seem desirable.

Illiterates should be examined by means of one or more of the following systematic procedures: (*a*) the Point Scale as adapted for illiterates; (*b*) the Stanford-Binet scale as adapted for illiterates; (*c*) the Performance Scale with oral instructions. In certain instances it may be obviously desirable or necessary to use the Performance Scale in addition to the one or the other adapted scale. As a rule it should be unnecessary to use other than either the Point Scale or Stanford-Binet (complete or adapted) in the case of a subject who has attended an American school as much as four or five years. Inability to read and write *after that amount of schooling* nearly always indicates grave mental inferiorty, and should not be considered an excuse for failure on such tests as writing from dictation, counting backward, making change, etc. Those who are illiterate from complete lack of educational opportunity should be given the performance scale.

Non-English-speaking subjects can be examined safely only by means of the Performance Scale with non-verbal instructions. Those subjects who understand English slightly may profit by the use of such words as "no," "yes," etc. For this reason words may be used by the examiner to supplement his gestures, but they must not be depended upon as a means of conveying the idea of what is to be done in a given test.

The duration and extent of an individual examination should depend upon the nature of the case and should vary with the information necessary for safe report and recommendation. In some instances only a few tests need be given, in others, even a prolonged examination may leave the examiner in doubt concerning suitable recommendation, and may force him to appeal to company commander or others for supplementary information. Unless conditions render haste imperative, the examiner should obtain a definite intelligence rating for each subject in terms of mental age.

Condensed instructions for administering the Point Scale and the Stanford-Binet scale are printed in this guide for the convenience of examiners, but these instructions can be used safely only on the basis of thorough knowledge of the detailed descriptions of these two scales which are available in book form. The Performance Scale is fully described in this guide, since its constituent parts and their standardization are newly chosen and especially adapted for army use.

It is the task of the psychological examiner to obtain reliable intelligence ratings and to make recommendations based thereupon. Where serious mental peculiarties or psychopathic conditions are discovered, full report should be made and the subject promptly referred to the psychiatrist with such information as the psychological examination has supplied.

The examiner's recommendations.—As a result of careful psychological examination, the examiner may conclude, (1) that the subject should be assigned or returned to appropriate military organization for regular training; (2) that he should be assigned or transferred to the Development Battalion or to a service organization in which simple forms of manual labor are the chief requirement; (3) that he should be recommended to the psychiatrist for discharge by reason of intellectual deficiency; (4) that he should be referred to the psychiatrist for further examination because of peculiarities of behavior or definite psychopathic tendencies.

It is impossible to state with safety the particular degree of intellectual deficiency which justifies recommendation for discharge. Other factors than intelligence contribute to a man's serviceableness in the Army. These must be taken into account. If the officers who are attempting to train a man are satisfied with his responses, the indications are that he should not be discharged, even if very inferior in intelligence. *In general, subjects whose mental age is below eight should be seriously considered for discharge or Development Battalion. Those whose mental ages range from eight to ten should be considered for use in special service organizations or for assignment to Development Battalion.* All others, except those whose psychotic symptoms would cause their immediate reference to the neuropsychiatric examiner, should be assigned to regular training organizations.

Grade E shall be given to all men who are recommended by the examiner for discharge, Development Battalion, or service organizations, *and to such men only.* All men whose intelligence is deemed satisfactory for regular military duty shall be given rating of D− or higher.

In this connection too great emphasis can not be laid upon the use of common sense as well as technical skill and information by the psychological examiner. While doing his utmost to obtain reliable measurement of mental traits, he should be quick to observe indications of qualities of physique, temperament, and character which are important in the soldier.

2. POINT SCALE EXAMINATION.

(a) PROCEDURE.[1]

Test 1, æsthetic comparison and judgment.

Expose first only pair (*a*) of test 1, trial 1;[2] next pair (*b*); and last pair (*c*), saying each time, "*Which is the prettier of these two faces?*" If prettier is unintelligible, ask "*Which do you like the better?*" Record judgment (+ or −) each time. If there have been any correct judgments, repeat the procedure with trial 2.

Credit 1 point for each pair, if both judgments have been correct. Total possible credits, 3.

Test 2, perception and comparison of pictures (missing parts).

Present card (test 2, *a*) asking simply, "*What is missing in this picture of a woman?*" If subject responds "hands" or "arms," pass on to the next part of the test, but if instead he says "hat," ask "*What else?*" If again he replies incorrectly, consider the attempt a failure and pass on to card *b*, *c*, *d*. With the faces (*c*) and (*d*) covered, present face (*b*) asking, "*What is missing in this face?*" If subject replies "an ear," ask "*What else?*" Similarly present (*c*) and (*d*), giving two chances and no more.

Credit 1 point for each correct response. Total possible credits, 4.

Test 3, comparison of lines and weights.

(*a*) Present the lines on card (test 3, *a*) with the longer one above, saying, "*Which is the longer of these two lines?*" If the answer is incorrect, proceed no farther; if correct, remove the card from view, turn it upside down, and present it with the longer line below. (*b*) Next place before subject the 3 and 12 gram weights, about 5 centimeters apart, saying, "*I wish you to tell me which is the heavier of these two blocks.*" If subject merely chooses a weight by pointing, ask "*How do you know?*" and if he still hesitates to touch them, say, "*You may touch them if you wish to.*" If subject responds correctly by lifting the weights and selecting the heavier one, reverse the blocks in position and give a second trial. (*c*) Same procedure, with 6 and 15 gram weights.

Credit 1 point for (*a*) if both judgments have been correct. Similarly for (*b*) and (*c*). Total possible credits, 3.

Test 4, memory span for digits.

Digits used:	(*a*)	(*b*)	(*c*)	(*d*)	(*e*)
First set	374	2947	35871	491572	2749385
Second set	581	6135	92736	516283	6195847

Say, "*Listen, and repeat exactly what I say.*" Then read distinctly and at the rate of two per second, in a perfectly monotonous tone, the following digits, "*3, 7, 4*" and pause for response. If subject fails to grasp the idea and makes no response, tell him again to listen carefully and to say just what you say. Then present again the same set of digits. If subject repeats them correctly, pass on to the first set of four digits given under (*b*). If he fails to repeat correctly the first set of three digist, he is given the second set "*5, 8, 1.*" If subject fails in this trial, the test is dis-

[1] The following condensed directions for point scale examination should be supplemented by reference to Yerkes, Bridges and Hardwick, "A Point Scale for Measuring Mental Ability," Warwick and York, Baltimore.

[2] See material for point scale examination.

continued; if he succeeds, proceed to the next larger group of digits. Similarly for (*b*), (*c*), (*d*), and (*e*). Only in (*a*) is a second trial allowed with the first set.

Credit (*a*), (*b*), (*c*), (*d*), and (*e*) 1 point each for correct reproduction of either set. Total possible credits, 5.

Test 5, counting backward.

(*a*) Say, "*I wish you to count backward from 20 to 1, like this: 25, 24, 23, 22, 21.*" At this point pause and wait for subject to continue counting. (*b*) If he is unable to make a start, examiner should himself continue "*20, 19, 18, 17, 16*" and pause again for subject to take up the counting. (*c*) If once more subject fails to make a start, examiner should continue "*15, 14, 13, 12, 11*" and again pause. (*d*) If subject is still unable to respond, examiner should count "*10, 9, 8, 7, 6*"—and once more pause.

If subject takes up the counting at 20 and counts without mistake to 1 in about 30 seconds, 4 points credit should be given. If he makes a single mistake (reversal or omission) he should be asked to repeat, and if the mistake is corrected, full credit should be given; if it is not corrected he should be credited for counting from the next multiple of five below his mistake. The credit for counting correctly from 15 to 1 is 3 points; from 10 to 1, 2 points; from 5 to 1, 1 point. The time limit for (*b*), (*c*), and (*d*) is also 30 seconds. Total possible credits, 4.

Test 6, repetition of sentences.

Say, "*Listen carefully and repeat just what I say.*" Be sure subject is attending then read (*a*) slowly and distinctly. If subject makes no response, repeat. Whether or not subject succeeds with (*a*) on second trial, proceed to (*b*). Whenever further failure occurs discontinue the test.

Credit 1 point each for (*a*) and (*b*), 2 points each for (*c*) and (*d*) repeated correctly, or with only an error due to an evident misunderstanding of a word. Total possible credits, 6.

Test 7, description of pictures.

Show card (test 7, *a*) saying, "*Please look at this picture and tell me about it.*" Similarly for (*b*) and (*c*).

Credit 1 point each for (*a*), (*b*), and (*c*) for enumeration; 2 points each for description, whether or not accompanied by enumeration; 3 points each for interpretation, whether or not accompanied by description. Total possible credits, 9.

Test 8, arranging weights.

Place 3, 6, 9, 12, and 15-gram weights on table before subject and say, "*These little blocks are all the same size, but they weigh different amounts. Some are heavier and some are lighter. I wish you to place the heaviest one here; and next to it, here, the one which is just a little less heavy; and then here, the one which is a little less heavy than that; and then the one which is still a little less heavy; and finally, here, the lightest one of all.*" While speaking, point to the place on the table where each block belongs. It is essential to give this explicit form of directions to very inferior subjects, but usually examiner need only say, "*I wish you to arrange these blocks in order of weight, beginning with the heaviest one, here, and placing the lightest one here, at the opposite end of the series.*" If first arrangement is not correct, give second trial, cautioning subject to be careful and not to hurry too much.

Credit 2 points for one entirely correct arrangement; 1 point, if in either the first or second trial the arrangement is correct except for the interchange of two consecutive blocks. Total possible credits, 2.

Test 9, comparison of objects.

Say, "*You know what an apple is? You know what a banana is? Tell me how they are different from one another.*" Same procedure for *wood and glass*, and *paper and cloth*. If only one point of difference is given, say, "*What other differences are there?*"

Credit 1 point for one correct point of difference, 2 points for two or more correct points of difference in each pair. Total possible credits, 6.

Test 10, definitions of concrete terms.

Say, (*a*) "*What is a spoon?*" (*b*) "*What is a chair?*" and similarly for *horse* and *baby*.

Credit 1 point for definition in terms of use, and 2 points for definitions in terms superior to use. (See book.) Total possible credits, 8.

Test 11, resistance to suggestion.

Show subject successively cards (*a*), (*b*), and (*c*) with longer line always on subject's right, saying, "*Which is the longer of these two lines?*" Follow immediately with cards (*d*), (*e*), and (*f*), changing form of question to "*And of these?*" Record each judgment.

Credit 1 point each for response of "equal" or "left" to (*d*), (*e*), and (*f*), provided only there has been no incorrect response to (*a*), (*b*), or (*c*). Total possible credits, 3.

Test 12, copying square and diamond.

Place card (test 12, *a*) directly in front of subject and say, indicating back of record sheet, "*Please draw with your pencil a figure just like the one before you.*" Same for card (*b*).

Credit for square, 2 points for any figure which shows approximate equality of both lines and angles (see scoring card type *a*), and 1 point for figure showing approximate equality of angles but not of lines or of lines but not of angles (types *b* and *c*); for diamond, 2 points for any figure which shows approximate equality of both pairs of opposite angles (see scoring card, type *a*), and 1 point for figure showing approximate equality of only one pair of opposite angles (type *b*); no credit for anything indistinguishable from a square or unidentifiable readily as a diamond (type *c*). Total possible credits, 4.

Test 13, free association.

Say, "*I wish you to say all the words that you can think of in three minutes. When I say 'Ready,' you begin, and say as many words as you can before I tell you to stop. Say such words as pin, table, grass, trees, clouds, horse, dog, brook. All ready. Begin.*" If subject stops, as if assuming that enough words had been given, at the end of a half minute say, "*Go on, please.*" Repeat this, if necessary, at the end of each half minute for the whole period.

Credit for words or phrases (except for repetitions) as follows: 1 point for 30–44 words; 2 points for 45–59 words; 3 points for 60–74; 4 points for 75 and upward. Total possible credits, 4.

Test 14, use of three given words in one sentence.

On the back of the record sheet write plainly the words, Boston, money, river. Show them to subject, read them over twice, and say, "*I wish you to make one sentence in which the three words Boston, money, and river are used.*" Make sure that subject understands the three words, knows what is meant by a sentence, and grasps the fact that one, not two or more sentences, is required. It is especially necessary to emphasize that the three words are to be used along with other words in making one good sentence. The sentence may either be written, or given orally and recorded by examiner.

Credit 4 points for the three words used in one sentence; 2 points if they are used in two separate sentences or in sentences very loosely connected. Total possible credits, 4.

Test 15, comprehension of questions.

Read each question slowly and distinctly, twice if necessary. If subject fails to respond, he should be encouraged.

(*a*) *If you were going away and missed your train, what would you do?*

(*b*) *If some one has been unkind to you and says he is sorry, what should you do?*

(*c*) *Why should you judge a person by what he does rather than by what he says?*

(*d*) *Why do we more readily forgive an unkind act done in anger than one done without anger?*

Credit 2 points each for satisfactory answer. Half credit may sometimes be given (see book). Total possible credits, 8.

Test 16, drawing designs from memory.

Say to subject, "*I am going to show you two drawings. After you have looked at them, I shall take them away and ask you to draw both of them from memory. You must look at them carefully, because you will see them for only fifteen seconds, and that is a very short time.*"

Credit 2 points for each correct reproduction. Irregularity of line is disregarded. Credit 1 point for imperfect reproductions, such as those in which the rectangle is placed in center of prism, or small squares of (*b*) turned outward instead of inward (see scoring cards). Total possible credits, 4.

Test 17, criticisms of absurd statements.

Say, "*I am going to read some sentences to you. In each one of them there is something foolish or absurd.* (Make sure that subject understands what is meant by 'foolish' or by 'absurd.') *Listen carefully and tell me each time what it is that is foolish.*" Read each question slowly and distinctly, twice if necessary, and ask, "*Now, what is foolish about that?*"

(*a*) *We met a finely dressed gentleman. He was walking along the street with his hands in his pockets and swinging his cane.*

(*b*) *An unlucky bicycle rider fell on his head and was instantly killed; they took him to the hospital and fear that he can not get well.*

(*c*) *A little boy said: "I have three brothers, Paul, Ernest, and myself."*

(*d*) *At the crossroads was a guidepost with the following directions: "Boston, three miles and a half; if you can't read, inquire at the blacksmith shop."*

(*e*) *It has been found that the last car of a train is damaged most in case of accident. It would therefore be better to leave off the last car.*

Credit 1 point for each satisfactory response; no partial credits allowed. Total possible credits, 5.

Test 18, construction of sentences.

Show subject card (test 18, *a*) and say, "*You see these words. Read them to me, please.*" Be sure subject recognizes the words, then continue. "*Now, please arrange them so that they make sense. Make one good sentence out of them, using every word that you read, but no other words.*"

Credit 2 points each for (*a*), (*b*), and (*c*). No partial credits allowed (see book). Total possible credits, 6.

Test 19, definitions of abstract terms.

Say, "*What does charity mean?*" "*What does obedience mean?*" *What does justice mean?*" The definition of charity should express two ideas—that of unfortunates and of kindness shown them. If subject replies "love," ask him "*What sort of love?*" or "*To whom is the love shown?*" The definition of obedience should be "to do what you are told," or the equivalent idea. If subject says "to obey," ask him what obey means. The definition of justice should involve the idea of fairness, of treating people according to their merits, of protection accorded to people or their interests, etc. If subject replies "justice of the peace," tell him that is not the kind of justice meant and give another trial.

For acceptable response, as above defined, credit 2 points for each of the three terms; no partial credits allowed. Total possible credits, 6.

Test 20, analogies.

"If I say 'Man is to boy as woman is to ———,' what would you say?" Pause for a second, and if subject does not respond say *"Girl,"* adding, *"for girl has the same relation to woman as boy has to man,"* Then give the two following examples, supplying the missing term if subject can not do so: *"Boat is to water as train is to ———"* (track). *"Chew is to teeth as smell is to ———"* (nose). *"Now we'll try some others. Think well before you speak. Don't hurry."* Give (*a*) to (*f*) in order.

Credit 1 point for each correct response. Total possible credits, 6,

(b) ADAPTATION FOR USE WITH ILLITERATES.

In the examination of an illiterate subject, tests 14 and 18 should be omitted and the following additions made to the total score:

Total score.	Points added.	Total score.	Points added.
18–51	0	70–74	8
52–58	2	75–77	9
59–62	4	78–90	10
63–69	6		

(c) EXPRESSING AND INTERPRETING RESULTS.

The results of the point-scale examination should be expressed in the following ways: (1) Total score; (2) mental age; (3) letter rating. The accompanying tables will enable the examiner readily to transmute any point-scale score into mental age and letter rating.

Table of equivalent point-scale values.

Score.	Mental age.	Score.	Mental age.
88 to 100	18 or above	51	9.1
87	17.5	50	9.0
86	17.0	49	8.9
85	16.5	48	8.8
84	16.1	47	8.7
83	15.7	46	8.6
82	15.3	45	8.4
81	14.9	44	8.3
80	14.5	43	8.2
79	14.2	42	8.1
78	13.9	41	8.0
77	13.6	40	7.8
76	13.4	39	7.7
75	13.2	38	7.5
74	13.0	37	7.3
73	12.8	36	7.2
72	12.5	35	7.0
71	12.3	34	6.9
70	12.0	33	6.7
69	11.8	32	6.6
68	11.7	31	6.4
67	11.5	30	6.3
66	11.3	29	6.1
65	11.2	28	6.0
64	11.0	27	5.8
63	10.8	26	5.7
62	10.7	25	5.5
61	10.5	24	5.3
60	10.3	23	5.2
59	10.2	22	5.0
58	10.0	21	4.9
57	9.9	20	4.7
56	9.8	19	4.6
55	9.6	18	4.4
54	9.5	17	4.3
53	9.4	16	4.1
52	9.3	15	4.0

Subjects obtaining a score of 60 points or more may ordinarily be recommended for regular military training; subjects obtaining scores from 40 to 59 points should be considered for assignment to service organizations or to Development Battalion; subjects with scores below 40 points should be considered for discharge.

Letter ratings should be assigned as follows:

A	(Not given.)
B	95–100
C+	90–94
C	80–89
C−	70–79
D	60–69
D−	0–59
E	(See below.)

Grade E shall be given to all men who are recommended by the examiner for rejection, discharge, Development Battalion, or service organizations, *and to such men only.* All men whose intelligence is deemed satisfactory for regular military duty shall be given rating of D − or higher.

3. STANFORD-BINET EXAMINATION.

(a) PROCEDURE.[1]

III.

1. *Pointing to parts of body.*

Say, "*Show me your nose.*" "*Put your finger on your nose.*" If two or three repetitions of instructions bring no response, say, "*Is this* (pointing to chin) *your nose?*" "*No?*" "*Then where is your nose?*" Same for eyes, mouth, and hair.

Credit if correct part is indicated (in any way) three times out of four.

2. *Naming familiar objects.*

Show subject, one at a time, key (not Yale), penny (not new), closed knife, watch, pencil. Say each time, "*What is this?*" or "*Tell me what this is.*"

Credit if three responses out of five are correct.

3. *Pictures—enumeration.*

Say, "*Now I am going to show you a pretty picture.*" Show picture (*a*) and say, "*Tell me what you see in this picture,*" or "*Look at the picture and tell me everything you can see in it.*" If no response, "*Show me the* ———." "*That is fine; now tell me everything you see in the picture.*" If necessary ask, "*And what else?*" Same for pictures (*b*) and (*c*).

Credit if at least three objects in one picture are enumerated spontaneously, or if one picture is described or interpreted.

4. *Giving sex.*

"*Are you a man or woman?*" If subject does not respond, say "*Are you a woman?*" If answer is "*No*" or a shake of the head, say, "*Well, what are you? Are you a man or a woman?*"

5. *Giving last name.*

Ask, "*What is your name?*" If answer is only first or last name—e. g., Walter—say "*Yes, but what is your other name? Walter what?*" and if necessary, "*Is your name Walter Smith?*"

6. *Repeating sentences.*

"*Can you say 'nice kitty'?*" "*Now say 'I have a little dog.'*" If no response, examiner may repeat first sentence two or three times. Same procedure for (*b*) and (*c*), except that these may be given only once.

Credit if at least one sentence is given without error after a single reading.

Alt. *Repeating three digits.*

Say, "*Listen. Say 4, 2. Now say 6, 4, 1,*" etc. May repeat (*a*), not others. Rate a little faster than one digit per second.

Credit if one set out of the three is given correctly after a single reading.

IV.

1. *Comparison of lines.*

Show card and say, "*See these lines. Look closely and tell me which one is longer. Put your finger on the longest one.*" If no response, "*Show me which line is the biggest.*" Show twice more (reversing card at second showing) and ask, "*Which one is the longest here?*" If two out of three are correct, repeat the entire test.

Credit if three responses out of three, or five out of six, are correct.

2. *Discrimination of forms.*

Place circle at X on card and say, "*Show me one like this,*" at same time passing the finger around the circumference of the circle. If no response, "*Do you see all of these things?*" (running finger over the various forms). "*And do you see this one?*" (pointing to circle again). "*Now, find me another one just like this.*" A first error should be corrected, thus, "*No, find me one just like this*" (again passing finger around the outline of form at X). Make no comment on any other errors, but pass on to the square, then the triangle, and the rest in any order. Commend successes.

Credit for 7 correct choices out of 10. The first error, if corrected, counts as correct.

3. *Counting four pennies.*

Place four pennies in a horizontal row. Say, "*See these pennies. Count them and tell me how many there are. Count them with your finger, this way*" (pointing to the first one on the subject's left)—"*One.*" "*Now, go ahead.*" If subject gives number without pointing, say, "*No, count them with your finger, this way,*" starting him as before. Have subject count aloud.

Credit for correct count tallying with pointing.

4. *Copying square.*

Place card (IV–4) before subject, and give pencil, saying, "*You see that?*" (pointing to square). "*I want you to make one just like it. Make it right here*" (showing space on record blank). "*Go ahead. I know you can do it nicely.*" Unless drawing is clearly satisfactory, repeat twice more, saying each time "*Make it exactly like this*" and pointing to model.

Credit if one drawing is satisfactory. (See scoring card.)

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[1] Detailed direction for administering Stanford-Binet Scale and for scoring are available in Terman's "The Measurement of Intelligence, Houghton Mifflin Co. These directions are reproduced by permission of the publishers.

5. *Comprehension.*

Be sure to get subject's attention before asking question. Repeat if necessary. Allow 20 seconds for answer.

(*a*) "*What must you do when you are sleepy?*"

(*b*) "*What ought you to do when yo are cold?*"

(*c*) "*What ought you to do when you are hungry?*"

Credit if two responses of the three are correct.

6. *Repeating four digits.*

Say, "*Now, listen. I am going to say over some numbers and after I am through, I want you to say them exactly as I do. Listen closely and get them just right.*" Give (*a*), then (*b*), and (*c*) if necessary. May repeat (*a*) until attempt is made, but not others. Rate a little faster than one digit per second.

Credit if one set of the three is correctly repeated in order, after a single reading.

7. Alt. *Repeating sentences.*

Say, "*Listen, say this, 'Where is kitty?'*" "*Now, say this,———,*" reading the first sentence in a natural voice, distinctly and with expression. May re-read the first sentence.

Credit if at least one sentence is repeated correctly after a single reading.

V.

1. *Comparison of weights.*

Place the 3 and 15 gram weights before subject, 2 or 3 inches apart. Say, "*You see these blocks. They look just alike, but one of them is heavy and one is light. Try them and tell me which one is heavier.*" Repeat instructions if necessary, saying, "*Tell me which one is the heaviest.*" If subject merely points without lifting blocks, or picks up one at random, say, "*No, that is not the way. You must take the blocks in your hands and try them, like this.*" (Illustrate.) Give second trial with position of weights reversed; third trial with weights in same position as first.

Credit if two of three comparisons are correct.

2. *Naming colors.*

Show card (V2) and say, pointing to colors in the order, red, yellow, blue, green, "*What is the name of that color?*"

Credit if all colors are correctly named, without marked uncertainty.

3. *Æsthetic comparison.*

Show pairs of faces in order from top to bottom of card. Say, "*Which of these two pictures is the prettiest?*"

Credit if all *three* comparisons are made correctly.

4. *Definitions: Use or better.*

Say, "*You have seen a chair. You know what a chair is. Tell me, what is a chair?*" If necessary urge as follows: "*I am sure you know what a chair is. You have seen a chair.*" "*Now, tell me, what is a chair?*" If subject rambles say, "*Yes, but tell me; what is a chair?*" Same for horse, fork, doll, pencil, table.

Credit if four words out of the six are defined in terms of use or better.

5. *Patience.*

Lay cards thus △▽, and say, "*I want you to take these two pieces* (touching the two triangles) *and put them together so they will look exactly like this*"; (pointing to rectangle). If subject hesitates, repeat instructions with a little urging. If first attempt is a failure, replace pieces, saying, "*No; put them together so they will look like this*" (pointing to rectangle). Do not suggest further by face or word whether response is correct. If a piece is turned over, turn it back and don't count that trial. Give, if necessary, three trials of one minute each.

Credit if two of the trials are successful.

6. *Three commissions.*

Take subject to center of room. Say, "*Now, I want you to do something for me. Here's a key. I want you to put it on that chair over there; then I want you to shut* (*or open*) *that door, and then bring me the box which you see over there*" (pointing in turn to the objects designated). "*Do you understand? Be sure to get it right. First, put the key on the chair, then shut* (*or open*) *the door, then bring me the box* (again pointing). *Go ahead.*" Stress words *first* and *then*. Give no further aid.

Credit if the three commissions are executed in proper order.

Alt. *Giving age.*

Say, "*How old are you?*"

VI.

1. *Right and left.*

Say, "*Show me your right hand*" (stress *right* and *hand*, etc., rather strongly and equally). Same for left ear, right eye. If there is one error, repeat whole test, using *left hand, right ear, left eye.* Avoid giving aid in any way.

Credit if three of three, or five of six responses are correct.

2. *Missing parts.*

Show card (V–I2) and say, "*There is something wrong with this face. It is not all there. Part of it is left out. Look carefully and tell me what part of the face is not there.*" Same for (*b*) and (*c*). If subject gives irrelevant answer, say, "*No; I am talking about the face. Look again and tell me what is left out of the face.*" If correct response does not follow, point to the place where eye should be and say, "*See, the eye is gone.*" Then proceed to others, asking, "*What is left out of this face?*" For (*d*) say, "*What is left out of this picture?*" No help except on (*a*).

Credit if correct response is made for three of four pictures.

3. *Counting thirteen pennies.*

Place thirteen pennies in horizontal row. Say, "*See these pennies. Count them and tell me how many there are. Count them with your finger, this way*" (pointing to the first one on the subject's left)—"*One—Now, go ahead.*" If subject gives number without pointing, say, "*No, count them with your finger, this way,*" starting him as before. Have subject count aloud. Second trial given if only minor mistake is made.

Credit if one correct count, tallying with the pointing, is made in first or second trials.

4. *Comprehension.*

Say (*a*) "*What's the thing for a boy to do if it is raining when he starts to school?*"

(*b*) "*What's the thing to do if you find that your house is on fire?*"

(*c*) "*What's the thing to do if you are going some place and miss your train (car)?*" May repeat a question, but do not change form.

Credit if two of three responses are correct. (See book.)

5. *Naming four coins.*

Show in order nickel, penny, quarter, dime, asking, "*What is that?*" If answer is "money," say, "*Yes, but what do you call that piece of money?*"

Credit if three of four responses are correct.

6. *Repeating sentences.*

Say, "*Now, listen. I am going to say something and after I am through I want you to say it over just as I do. Understand? Listen carefully and be sure to say exactly what I say.*" Repeat, "*Say exactly what I say,*" before reading each sentence. Do not re-read any sentence.

Credit if one sentence out of three is repeated without error, or two with not more than one error each.

Alt. *Forenoon and afternoon.*

If a. m., ask, "*Is it morning or afternoon?*" If p. m., "*Is it afternoon or morning?*"

VII.

1. *Giving numbers of fingers.*

Say, "*How many fingers have you on one hand?*" "*How many on the other hand?*" "*How many on both hands together?*" If subject begins to count, say, "*No, don't count. Tell me without counting,*" and repeat question.

Credit if all three questions are answered correctly and promptly without counting (5, 5, 10 or 4, 4, 8).

2. *Pictures—description.*

Show card (*a*) and say, "*What is this picture about?*" "*What is this a picture of?*" May repeat question, but do not change it. Same for (*b*) and (*c*).

Credit if two of the three pictures are described or interpreted. (See book.)

3. *Repeating five digits.*

Say, "*Now, listen. I am going to say over some numbers and after I am through, I want you to say them exactly as I do. Listen closely and get them just right.*" Give (*a*), and if necessary (*b*) and (*c*). Do not re-read any set.

Credit if one set of the three is given correctly.

4. *Tying bowknot.*

Show subject the completed bowknot and say, "*You know what kind of a knot this is, don't you? It is a bow knot. I want you to take this other piece of string and tie the same kind of knot around my finger.*" Give subject string of same length and hold finger (or pencil, etc.) conveniently for subject.

Credit if double bow (both ends folded in) is tied within one minute. The usual half knot as basis must not be omitted. Single bow, half credit.

5. *Giving differences.*

Say, "*What is the difference between a fly and a butterfly?*" If subject does not understand, say, "*You know flies, do you not? You have seen flies? And you know the butterflies? Now, tell me the difference between a fly and a butterfly.*" Same for *stone* and *egg*, and *wood* and *glass*.

Credit if any real difference is given in two of three questions.

6. *Copying diamond.*

Place card VII–6 before subject, and give pen, saying, "*I want you to draw one exactly like this. Make it right here*" (showing space on record blank). Give three trials if necessary, saying each time, "*Make it exactly like this one.*" (Note that pen and ink must be used.)

Credit if two drawings are satisfactory. (See scoring card.)

Alt. 1. *Naming days of week.*

Say, "*You know the days of the week, do you not?*" "*Name the days of the week for me.*" If response is correct, check by asking, "*What day comes before Tuesday?*" "*Before Thursday?*" "*Before Friday?*"

Credit if correct response is given within 15 seconds, and if two of three checks are correct.

Alt. 2. *Three digits backwards.*

Say, "*Listen carefully. I am going to read some numbers again but this time I want you to say them backwards. For example, if I should say 5—1—4, you would say 4—1—5. Do you understand?*" Then, "*Ready, now; listen carefully, and be sure to say the numbers backwards.*" If subject gives digits forwards, repeat instructions. If necessary, give (*b*) and (*c*), repeating, "*Ready, now; listen carefully, and be sure to say the numbers backwards.*"

Credit if one set is repeated backwards without error.

VIII.

1. *Ball and field.*

Present "round field" on record blank with gate facing subject and say, "*Let us suppose that your baseball has been lost in this round field. You have no idea what part of the field it is in. You don't know what direction it came from, how it got there, nor with what force it came. All you know is that the ball is lost somewhere in the field. Now, take this pencil and mark out a path to show me how you would hunt for the ball so as to be sure not to miss it. Begin at the gate and show me what path you would take.*" If subject stops, say, "*But suppose you have not found it yet, which direction would you go next?*"

Credit in year VIII for "inferior" plan (or better); in years VIII and XII for "superior" plan. (See scoring card.)

2. *Counting 20 to 1.*

Say, "*You can count backwards, can you not? I want you to count backwards for me from 20 to 1. Go ahead.*" If subject counts 1–20 say "*No; I want you to count backwards from 20 to 1, like this: 20, 19, 18, and clear on down to 1. Now, go ahead.*" Have subject try, even if he says he can't, but do not prompt.

Credit for counting from 20 to 1 within 40 seconds with not more than one error. Spontaneous corrections allowed.

3. *Comprehension.*

Say, "*What's the thing for you to do—*

(*a*) "*When you have broken something which belongs to someone else?*

(*b*) "*When you are on your way to work and notice that you are in danger of being late?*

(*c*) "*If someone hits you without meaning to do it?*"

Questions may be repeated once or twice, but form must not be changed.

Credit if two or three responses are correct. (See book.)

4. *Finding likenesses—two things.*

Say, "*I am going to name two things which are alike in some way, and I want you to tell me how they are alike.*"

(*a*) "*Wood and coal—in what way are they alike?*" If difference is given, say, "*No; I want you to tell me how they are alike. In what way are wood and coal alike?*"

(*b*) "*In what way are an apple and a peach alike?*"

(*c*) "*In what way are iron and silver alike?*"

(*d*) "*In what way are a ship and an automobile alike?*"

Credit if any real likeness is given for two of the four pairs. (See book.)

5. *Definitions: superior to use.*

Ask, "*What is a balloon?*" Same for *tiger, football, soldier.* Do not comment on responses. May repeat questions.

Credit if two of four definitions better than use are given.

6. *Vocabulary.* See pages 181–182.

Alt. 1. *Naming six coins.*

Show nickel, penny, quarter, dime, silver dollar, and half-dollar, in order, asking, "*What is that?*" If answer is "money," say, "*Yes, but what do you call that piece of money?*"

Credit if all six coins are correctly named. Spontaneous corrections allowed.

Alt. 2. *Writing from dictation.*

Give pen, ink, and paper, and say, "*I want you to write something for me as nicely as you can. Write these words: 'See the little boy.' Be sure to write it all: 'See the little boy.'*" Do not dictate the words separately, nor give further repetition.

Credit if sentence is written without omission of word, and legibly enough to be easily recognized. Misspelling disregarded if word is easily recognizable. (See scoring card.)

IX.

1. *Giving the date.*

Ask in order, (*a*) "*What day of the week is to-day?*" (*b*) "*What month is it?*" (*c*) "*What day of the month is it?*" (*d*) "*What year is it?*" If subject gives day of month for day of week, or *vice versa*, repeat question with suitable emphasis. No other help.

Credit if there is no error greater than three days in (*c*) and no error in (*a*), (*b*), and (*d*). Spontaneous correction allowed.

2. *Arranging five weights.*

Place 3, 6, 9, 12, and 15 gram weights before subject and say, "*See these blocks. They all look alike, don't they? But they are not alike. Some of them are heavy, some are not quite so heavy, and some are still lighter. No two weigh the same. Now, I want you to find the heaviest one and place it here. Then find the one that is just a little lighter and put it here. Then put the next lighter one here, and the next lighter one here, and the lightest of all at this end* (pointing). *Do you understand? Remember now, that no two weights are the same. Find the heaviest one and put it here, and the next heaviest here, and lighter, lighter, until you have the very lightest here. Ready, go ahead.*" Give second and, if necessary, third trial, repeating instructions only if subject has used an absurd procedure.

Credit for correct arrangement in two of three trials.

3. *Making change.*

Ask, "*If I were to buy 4 cents worth of candy and should give the storekeeper 10 cents, how much money would I get back?* Similarly for 15–12 cents, and 25–4 cents. Subject is not allowed coins or pencil and paper. If subject forgets problem, repeat once, but not more. Spontaneous corrections allowed.

Credit if two answers of three are correct.

4. *Four digits backwards.*

Say, "*Listen carefully. I am going to read some numbers, and I want you to say them backwards. For example, if I should say 5—1—4, you would say 4—1—5. Do you understand?*" Then, "*Ready now; listen carefully, and be sure to say the numbers backwards.*" If subject gives digits forwards, repeat instructions. If necessary, give (*b*) and (*c*), repeating each time, "*Ready now; listen carefully, and be sure to say the numbers backwards.*"

Credit if one set is repeated backwards without error.

5. *Three words in one sentence.*

Say, "*You know what a sentence is, of course. A sentence is made up of some words which say something. Now, I am going to give you three words, and you must make up a sentence that has all three words in it. The three words are 'boy,' 'river,' 'ball.' Go ahead and make up a sentence that has all three words in it.*" Repeat instructions if necessary, but do not illustrate. May say, "*The three words must be put with some other words so that all of them together will make a sentence.*" Give only one trial, and do not caution against making more than one sentence. Do not hurry subject, but allow only one minute. Then say, "*Now make a sentence that has in it the three words 'work,' 'money,' 'men.'*" If necessary give (*c*) *desert, rivers, lakes,* in same way.

Credit if satisfactory sentence is given in two of three trials. (See book.)[1]

6. *Finding rhymes.*

Say, "*You know what a rhyme is, of course. A rhyme is a word that sounds like another word. Two words rhyme if they end in the same sound. Understand?*" Continue, "*Take the two words 'hat' and 'cat.' They sound alike and so they make a rhyme. 'Hat,' 'cat,' 'rat,' 'bat,' all rhyme with one another. Now, I am going to give you a word and you will have one minute to find as many words as you can that rhyme with it. The word is 'day.' Name all the words you can think of that rhyme with 'day.'*" If subject fails, repeat explanation, and give sample rhymes for day, as *say, may, pay, hay.* Otherwise, proceed, "*Now, you have another minute to name all the words you can think of that rhyme with 'mill.'*" Same, if necessary, for *spring.* Do not repeat explanation after "mill" or "spring."

Credit if three rhymes in one minute are given for each of two out of three words.

Alt. 1. *Naming the months.*

Say, "*Name all the months of the year.*" If correct, check by asking, "*What month comes before April?*" "*Before July?*" "*Before November?*"

Credit if months are correctly named within 15 seconds with not more than one error, and if two of three checks are correct.

Alt. 2. *Counting value of stamps.*

Say, "*You know, of course, how much a stamp like this costs* (pointing to a 1-cent stamp). *And you know how much one like this costs* (pointing to a 2-cent stamp). *Now, how much money would it take to buy all of these stamps?*" (showing three 1-cent stamps and three 2-cent stamps). Do not tell values, where not known; if values are known but sum is wrongly given, give second trial, saying, "*Tell me how you got it.*"

Credit if correct value is given in not over 15 seconds.

X.

1. *Vocabulary.* See pages 181–182.

2. *Absurdities.*

"*I am going to read a sentence which has something foolish in it, some nonsense. I want you to listen carefully and tell me what is foolish about it.*" After reading say, "*What is foolish about that?*" Give sentences twice if necessary, repeating exactly. If response is ambiguous, ask subject what he means.

(*a*) *A man said: "I know a road from my house to the city which is down hill all the way to the city and down hill all the way back home."*

(*b*) *An engineer said that the more cars he had on his train the faster he could go.*

(*c*) *Yesterday the police found the body of a girl cut into eighteen pieces. They believe that she killed herself.*

(*d*) *There was a railroad accident yesterday, but it was not very serious. Only forty-eight people were killed.*

(*e*) *A bicycle rider, being thrown from his bicycle in an accident, struck his head against a stone and was instantly killed. They picked him up and carried him to the hospital, and they do not think he will get well again.*

Credit if four responses out of five are satisfactory.

3. *Drawing designs from memory.*

Give subject pencil and paper, then say, "*This card has two drawings on it. I am going to show them to you for ten seconds, then I will take the card away and let you draw from memory what you have seen. Examine both drawings carefully and remember that you have only ten seconds.*" Show card X–3 for 10 seconds, right side up. Have subject reproduce designs immediately, and note on his paper which is the top of his drawing.

Credit if one design is reproduced correctly, with other at least half correct. (See scoring cards.)

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[1] "The Measurement of Intelligence."

4. *Reading and report.*

Show card and say, "*I want you to read this for me as nicely as you can.*" Pronounce for subject all words he can not make out, allowing not over 5 seconds' hesitation. (Record reading time and errors.) When subject has finished say, "*Very well done. Now, I want you to tell me what you read. Begin at the first and tell everything you can remember.*" When subject stops, ask, "*And what else? Can you remember any more of it?*"

New York, | September 5th. | A fire | last night | burned | three houses | near the center | of the city. | It took some time | to put it out. | The loss was fifty thousand dollars, | and seventeen families lost their homes. | In saving | a girl | who was asleep in bed, | a fireman | was burned | on the hands.

Credit if selection is read within 35 seconds with not more than two errors and if report given contains at least eight "memories" as separated above. Minor changes in wording allowed. Scoring is done by placing thin paper over barred copy above and checking memories.

5. *Comprehension.*

Ask in order,

(*a*) "*What ought you to say when someone asks your opinion about a person you don't know very well?*"

(*b*) "*What ought you to do before undertaking (beginning) something very important?*"

(*c*) "*Why should we judge a person more by his actions than by his words?*"

May repeat but not change question except to substitute *beginning* in (*b*) in case *undertaking* seems not to be understood.

Credit if two of three replies are satisfactory. (See book.)

6. *Naming sixty words.*

Say, "*Now, I want to see how many different words you can name in 3 minutes. When I say ready, you must begin and name the words as fast as you can, and I will count them. Do you understand? Be sure to do your very best, and remember that just any words will do, like 'clouds,' 'dog,' 'chair,' 'happy,'—ready; go ahead.*" Whenever there is a pause of 15 seconds, say, "*Go ahead, as fast as you can. Any words will do.*" Don't allow sentences or counting; if attempted, interrupt with "*Counting (or sentences) not allowed. You must name separate words. Go ahead.*"

Credit if 60 words, exclusive of repetitions, are given in three minutes.

Alt. 1. *Repeating six digits.*

"*Now, listen. I am going to say over some numbers and after I am through I want you to say them exactly as I do. Listen closely and get them just right.*" Give (*a*) and if necessary (*b*).

Credit if one set is given without error.

Alt. 2. *Repeating sentences.*

Say, "*Now, listen. I am going to say something and after I am through I want you to say it over just as I do. Understand? Listen carefully and be sure to say exactly what I say.*" Repeat "*Say exactly what I say*" before reading each sentence. Do not re-read any sentence.

Credit if one sentence out of three is repeated without error, or two with not more than one error each.

Alt. 3. *Healy-Fernald puzzle.*

Place frame (short side toward subject) and blocks on table and say, "*I want you to put these blocks in this frame so that all the space will be filled up. If you do it rightly, they will all fit in and there will be no space left over. Go ahead.*" Do not suggest hurrying. Note procedure, especially tendencies to repeat absurd moves, and moves which leave spaces obviously impossible to fill.

Credit if subject fits blocks into place three times within a total time of five minutes for the three trials.

XII.

1. *Vocabulary.* See pages 181–182

2. *Definitions—abstract words.*

Say, "*What is pity?*" "*What do we mean by pity?*" etc. If response contains word to be defined, ask, "*Yes, but what does it mean to pity some one?*" Same for *revenge, charity, envy, justice.* Question subject if response is not clear.

Credit if three of the five words are satisfactorily defined. (See book.)

3. *Ball and field.*

Present "round field" on record blank with gate facing subject and say, "*Let us suppose that your baseball has been lost in this round field. You have no idea what part of the field it is in. You don't know what direction it came from, how it got there, nor with what force it came. All you know is that the ball is lost somewhere in the field. Now, take this pencil and mark out a path to show me how you would hunt for the ball so as to be sure not to miss it. Begin at the gate and show me what path you would take.*" If subject stops, say, "*But suppose you have not found it yet, which direction would you go next?*"

Credit in year VIII for "inferior" plan (or better); in years VIII and XII for "superior" plan. (See scoring card.)

4. *Dissected sentences.*

Show card XII–4, indicate first group of words, and say, "*Here is a sentence that has the words all mixed up, so that they don't make any sense. If the words were changed around in the right order they would make a good sentence. Look carefully and see if you can tell me how the sentence ought to read.*" Do not hurry subject, but allow only one minute. If subject fails on the first sentence, read it for him slowly and correctly, pointing at each word as you speak it. Same procedure for second and third, except that no help is given.

Credit if two sentences of three are correct, or one correct and two nearly correct. (See book.) Time, 1 minute each.

5. *Interpretation of fables.*

Present fables in order given below. Say, "*You know what a fable is? You have heard fables? Fables, you know, are little stories which teach us a lesson. Now, I am going to read a fable to you. Listen carefully, and when I am through I will ask you to tell me what lesson the fable teaches us.*" After reading, say, "*What lesson does that teach us?*" Question subject if response is not clear. Ask also if fable has been heard before. Proceed with (*b*), (*c*), (*d*), and (*e*) thus: "*Here is another. Listen again and tell me what lesson this fable teaches us.*" After each ask, "*What lesson does that teach us?*"

(*a*) Hercules and the wagoner.

A man was driving along a country road, when the wheels suddenly sank in a deep rut. The man did nothing but look at the wagon and call loudly to Hercules to come and help him. Hercules came up, looked at the man, and said: "Put your shoulder to the wheel, my man, and whip up your oxen." Then he went away and left the driver.

(*b*) The milkmaid and her plans.

A milkmaid was carrying her pail of milk on her head, and was thinking to herself thus: "The money for this milk will buy 4 hens; the hens will lay at least 100 eggs; the eggs will produce at least 75 chicks; and with the money which the chicks will bring I can buy a new dress to wear instead of the ragged one I have on." At this moment she looked down at herself, trying to think how she would look in her new dress; but as she did so the pail of milk slipped from her head and dashed upon the ground. Thus all her imaginary schemes perished in a moment.

(*c*) The fox and the crow.

A crow, having stolen a bit of meat, perched in a tree and held it in her beak. A fox, seeing her, wished to secure the meat, and spoke to the crow thus: "How handsome you are! And I have heard that the beauty of your voice is equal to that of your form and feathers. Will you not sing for me, so that I may judge whether this is true?" The crow was so pleased that she opened her mouth to sing and dropped the meat, which the fox immediately ate.

(*d*) The farmer and the stork.

A farmer set some traps to catch cranes which had been eating his seed. With them he caught a stork. The stork, which had not really been stealing, begged the farmer to spare his life, saying that he was a bird of excellent character, that he was not at all like the cranes, and that the farmer should have pity on him. But the farmer said: "I have caught you with these robbers, the cranes, and you have got to die with them."

(*e*) The miller, his son, and the donkey.

A miller and his son were driving their donkey to a neighboring town to sell him. They had not gone far when a child saw them and cried out: "What fools those fellows are to be trudging along on foot when one of them might be riding." The old man, hearing this, made his son get on the donkey, while he himself walked. Soon they came upon some men. "Look," said one of them, "see that lazy boy riding while his old father has to walk." On hearing this the miller made his son get off, and he climbed upon the donkey himself. Farther on they met a company of women, who shouted out: "Why, you lazy old fellow, to ride along so comfortably while your poor boy there can hardly keep pace by the side of you!" And so the good-natured miller took his boy up behind him and both of them rode. As they came to the town a citizen said to them, "Why, you cruel fellows! You two are better able to carry the poor little donkey than he is to carry you." "Very well," said the miller, "we will try." So both of them jumped to the ground, got some ropes, tied the donkey's legs to a pole and tried to carry him. But as they crossed the bridge the donkey became frightened, kicked loose, and fell into the stream.

Credit in year XII if score is 4 points or more; in year XVI if score is 8 points or more. Allow 2 points for each fable correct, and 1 for partially correct response. (Note carefully scoring directions in book.)

6. *Five digits backwards.*

"*Listen carefully! I am going to read some numbers, and I want you to say them backwards. For example, if I should say 5—1—4, you should say 4—1—5. Do you understand?*" Then, "*Ready now; listen carefully, and be sure to say the numbers backwards.*" If subject gives digits forwards, repeat instructions. If necessary, give (*b*) and (*c*), repeating each time, "*Ready now, listen carefully and be sure to say the numbers backwards.*"

Credit if one set is repeated backwards without error.

7. *Pictures—interpretation.*

Show in succession Dutch Home, River Scene, Post office, and Colonial House, saying each time, "*Tell me what this picture is about. Explain this picture.*" May prompt with, "*Go ahead,*" or "*Explain what you mean.*"

Credit if three of the four pictures are satisfactorily interpreted. (See book.)

8. *Finding likenesses; three things.*

Say; "*I am going to name three things which are alike in some way, and I want you to tell me how they are alike. Snake, cow, and sparrow; in what way are they alike?*" May repeat or urge with, "*I'm sure you can tell me how a snake, a cow, and a sparrow are alike,*" but do not change form of question. If difference is given, say, "*No, I want you to tell me how they are alike. In what way are a snake, a cow, and a sparrow alike?*" Same for (*b*) *book, teacher, newspaper;* (*c*) *wool, cotton, leather;* (*d*) *knife-blade, penny, piece of wire;* (*e*) *rose, potato, tree.*

Credit if any real similarity is given in three out of five trials.

XIV.

1. *Vocabulary.* See pages 181–182.

2. *Induction test.*

(If XVIII–2 is to be given, it should precede this test.) Provide six sheets of tissue paper, 8½ by 11 inches. Take the first sheet, and telling subject to watch what you do, fold it once, and in the middle of the folded edge cut out a small notch; then ask subject to tell you *how many holes there will be in the paper when it is unfolded. Whatever the answer,* unfold the paper and hold it up broadside for subject's inspection. Next, take another sheet, fold it once as before and say, "*Now, when we folded it this way and tore out a piece, you remember it made one hole in the paper. This time we will give the paper another fold and see how many holes we shall have.*" Then proceed to fold the paper again, this time in the other direction, cut out a piece from the folded side, and ask *how many holes there will be when the paper is unfolded.* Then unfold the paper, hold it up before subject so as to let him see the result. Whatever the answer, proceed with the third sheet. Fold it once and say, "*When we folded it this way there was one hole.*" Fold it again and say, "*And when we folded it this way there were two holes.*" Fold the paper a third time and say, "*Now, I am folding it again. How many holes will it have this time when I unfold it?*" Again unfold paper while subject looks on. Continue in the same manner with sheets, four, five, and six, adding one fold each time. In folding each sheet recapitulate results, saying (with the sixth, for example): "*When we folded it this way there was one hole; when we folded it again there were two; when we folded it again there were four; when we folded it again there were eight; when we folded it again there were sixteen; now tell me how many holes there will be if we fold it once more.*" Avoid saying, "When we folded it once, twice, three times." After sixth response, ask, "*Can you tell me a rule by which I could know each time how many holes there are going to be?*"

Credit if answer to sixth question is correct, and governing rule is correctly stated.

3. *President and king.*

Say, "*There are three main differences between a president and a king; what are they?*" If subject stops after one difference is given, urge him on, if possible, until three are given.

Credit if two of the three correct answers are given.

4. *Problem questions.*

Say, "*Listen, and see if you can understand what I read.*" Then read the problem slowly and with expression. If necessary, re-read problem.

(*a*) *A man who was walking in the woods near a city stopped suddenly very much frightened, and then ran to the nearest policeman, saying, that he had just seen hanging from the limb of a tree a ——— a what?*

(*b*) *My neighbor has been having queer visitors. First, a doctor came to his house, then a lawyer, then a minister (preacher or priest). What do you think happened there?*

(*c*) *An Indian who had come to town for the first time in his life saw a white man riding along the street. As the white man rode by, the Indian said: "The white man is lazy; he walks sitting down." What was the white man riding on that caused the Indian to say, "He walks sitting down"?*

Credit if two of the three problems are satisfactorily answered.

5. *Arithmetical reasoning.*

Give subject card XIV–5, exposing problems one at a time. Have subject read each problem aloud and, with the printed problem still before him, find the answer without the use of pencil or paper. In the case of illiterates, examiner reads each problem for subject two or three times.

Credit if two of the three problems are correctly solved, within one minute each.

6. *Reversing hands of clock.*

Say, "*Suppose it is six-twenty-two o'clock, that is, twenty-two minutes after six; can you see in your mind where the large hand would be, and where the small hand would be?*" "*Now, suppose the two hands of the clock were to trade places, so that the large hand takes the place were the small hand was, and the small hand takes the place where the large hand was, what time would it then be?*" Repeat the test with the hands at 8.08 (8 minutes after 8), and again with the hands at 2.46 (14 minutes before 3).

Credit if two of the three problems are solved with reasonable accuracy. (See book).

Alt. *Repeating seven digits.*

"*Now listen. I am going to say over some numbers, and after I am through I want you to say them exactly as I do. Listen closely and get them just right.*" Give (*a*) and if necessary (*b*).

Credit if one set is reproduced without error.

XVI.—"Average adult."

1. *Vocabulary.* See pages 181–182.

2. *Interpretation of fables.* See page 178.

3. *Differences between abstract terms.*

Ask "*What is the difference between—*

(*a*) "*Laziness and idleness?*

(*b*) "*Evolution and revolution?*

(*c*) "*Poverty and misery?*

(*d*) "*Character and reputation?*"

If answer is ambiguous, get subject to explain. If he merely defines the words say "*Yes, but I want you to tell me the difference between —— and ——.*"

Credit if three of the four answers are given correctly. (See book.)

4. *Enclosed boxes.*

Show subject a small cardboard box, and say, "*You see this box; it has two smaller boxes inside of it, and each one of the smaller boxes contains a little tiny box. How many boxes are there altogether, counting the big one? Remember, first the large box, then two smaller ones, and each of the smaller ones contains a little tiny box.*" Allow one-half minute, record answer, then show second box, saying, "*This box has two smaller boxes inside, and each of the smaller boxes contains two tiny boxes. How many altogether? Remember, first the large box, then two smaller ones, and each smaller one contains two tiny boxes.*" Similarly for (c) and (d), using three and three, and four and four.

Credit if three of the four problems are solved correctly within one-half minute each.

5. *Six digits backwards.*

Say, "*Listen carefully. I am going to read some numbers, and I want you to say them backwards. For example, if I should say 5—1—4, you would say 4—1—5. Do you understand?*" Then, "*Ready now; listen carefully, and be sure to say the numbers backwards.*" If subject gives digits forwards repeat instructions. If necessary, give (b) and (c), repeating each time, "*Ready now; listen carefully and be sure to say the numbers backwards.*"

Credit if one set is repeated backwards without error.

6. *Code.*

Show subject the code given on card XVI–6. Say, "*See these diagrams here? Look and you will see that they contain all the letters of the alphabet. Now, examine the arrangement of the letters. They go* (pointing) *a b c, d e f, g h i, j k l, m n o, p q r, s t u v, w x y z. You see the letters in the first two diagrams are arranged in the up-and-down order* (pointing again), *and the letters in the other two diagrams run in just the opposite way from the hands of a clock* (pointing). *Look again and you will see that the second diagram is just like the first, except that each letter has a dot with it, and that the last diagram is like the third except that here, also, each letter has a dot. Now, all of this represents a code; that is, a secret language. It is a real code, one that was used in the Civil War for sending secret messages. This is the way it works: We draw the lines which hold a letter, but leave out the letter. Here, for example, is the way we would write 'spy.'*" Then write the words "spy" and "war," pointing out carefully where each letter comes from, and emphasizing the fact that the dot must be used in addition to the lines in writing any letter in the second or fourth diagram. Then add: "*I am going to have you write something for me; remember, now, how the letters go, first* (pointing, as before) *a b c, d e f, g h i, then j k l, m n o, p q r, then s t u v, then w x y z. And don't forget the dots for the letters in this diagram and this one*" (pointing). At this point, take away the diagrams, give subject pencil and paper, and tell him to write the words "come quickly." Say nothing about hurrying. Do not permit subject to reproduce the code and then to copy the code letters from his reproduction.

Credit if words are written within six minutes with not more than two errors, omission of dot counting as half error.

Alt. 1. *Repeating sentences.*

Say, "*Now, listen. I am going to say something and after I am through I want you to say it over just as I do. Understand? Listen carefully and be sure to say exactly what I say.*" Repeat "*Say exactly what I say*" before reading each sentence. Do not re-read any sentence.

Credit if one sentence is repeated without a single error.

Alt. 2. *Comprehension of physical relations.*

(a) Draw a horizontal line 6 or 8 inches long. An inch or two above it draw a horizontal line about an inch long parallel to the first. Say, "*The long line represents the perfectly level ground of a field, and the short line represents a cannon. The cannon is pointed horizontally (on a level) and is fired across this perfectly level field.*" After it is clear that these conditions of the problem are comprehended, add, "*Now, suppose that this cannon is fired off and that the ball comes to the ground at this point here* (pointing to the farther end of the line which represents the field). *Take this pencil and draw a line which will show what path the cannon ball will take from the time it leaves the mouth of the cannon till it strikes the ground.*"

(b) Say, "*You know, of course, that water holds up a fish that is placed in it. Well, here is a problem: Suppose we have a bucket which is partly full of water. We place the bucket on the scales and find that with the water in it it weighs exactly 45 pounds. Then we put a 5-pound fish into the bucket of water. Now, what will the whole thing weigh?*" If subject responds correctly, say, "*How can this be correct, since the water itself holds up the fish?*"

(c) "*You know, do you not, what it means when they say a gun 'carries 100 yards?' It means that the bullet goes 100 yards before it drops to amount to anything.*" When this is clear, proceed, "*Now, suppose a man is shooting at a mark about the size of a quart can. His rifle carries perfectly more than 100 yards. With such a gun is it any harder to hit the mark at 100 yards than it is at 50 yards?*"

Credit if two of the three problems are satisfactorily solved. (See book.)

XVIII—("Superior adult.")

1. *Vocabulary.* See pages 181–182.

2. *Paper-cutting test.*

Take a piece of paper 6 inches square and say, "*Watch carefully what I do. See, I fold the paper this way* (folding it once over in the middle). *Then I fold it this way* (folding it again in the middle, but at right angles to the first fold). *Now, I will cut out a notch right here*" (indicating). Cut notch, keeping fragments out of view. Leave folded paper exposed, but pressed flat against table. Then give subject a pencil and a second sheet of paper like the one already used and say, "*Take this piece of paper and make a drawing to show how the other sheet of paper would look if it*

were unfolded. Draw lines to show the creases in the paper and show what results from the cutting." Do not permit subject to fold second sheet, and do not say, "draw the holes."

Credit if creases are correctly represented, with correct number of holes correctly located.

3. *Repeating eight digits.*

Say, "*Now, listen. I am going to say over some numbers and after I am through, I want you to say them exactly as I do. Listen closely and get them just right.*" Give (*a*), and if necessary (*b*) and (*c*).

Credit if one set is reproduced without error.

4. *Repeating thought of passage.*

Say, "*I am going to read a little selection of about six or eight lines. When I am through I will ask you to repeat as much of it as you can. It doesn't make any difference whether you remember the exact words or not, but you must listen carefully so that you can tell me everything it says.*" Read (*a*), and if necessary (*b*), recording response verbatim. Urge subject to give thought of selection in his own words if he hesitates.

(*a*) *Tests such as we are now making are of value both for the advancement of science and for the information of the person who is tested. It is important for science to learn how people differ and on what factors these differences depend. If we can separate the influence of heredity from the influence of environment, we may be able to apply our knowledge so as to guide human development. We may thus in some cases correct defects and develop abilities which we might otherwise neglect.*

(*b*) *Many opinions have been given on the value of life. Some call it good, others call it bad. It would be nearer correct to say that it is mediocre; for on the one hand our happiness is never as great as we should like, and on the other hand our misfortunes are never as great as our enemies would wish for us. It is this mediocrity of life which prevents it from being radically unjust.*

Credit if main thoughts of one of the selections are given in reasonably consecutive order. (See book.)

5. *Seven digits backward.*

Say, "*Listen carefully, I am going to read some numbers, and I want you to say them backward. For example, if I should say 5—1—4 you would say 4—1—5. Do you understand?*" Then, "*Ready now, listen carefully, and be sure to say the numbers backward.*" If subject gives the digits forward, repeat instructions. If necessary, give (*b*) and (*c*), repeating reach time: "*Ready now, listen carefully and be sure to say the numbers backward.*"

Credit if one set is repeated backward without error.

6. *Ingenuity test.*

State problem (*a*) orally, repeating it if subject does not respond promptly. Do not allow subject to use pencil or paper, and ask him to give his solution orally as he works it out. Record his statement in full. If subject resorts to some such method as "fill the 3-pint vessel two-thirds full," or "I would mark the the inside of the 5-pint vessel so as to show where 4 pints come to," etc., inform him that such a method is not allowable; that this would be guessing, since he could not be sure when the 3-pint vessel was two-thirds full, or whether he had marked off his 5-pint vessel accurately. Tell him he must measure out the water without any guesswork and explain also that it is a fair problem not a "catch". Say nothing about pouring from one vessel to another, but if subject asks whether this is permissible say "*yes.*" If subject has not solved (*a*) correctly within five minutes, explain the solution in full and proceed to (*b*). State (*b*) orally and allow subject five minutes for its solution. Do not explain in case of failure. If subject succeeds on either (*a*) or (*b*), but not with both, give problem (*c*) orally, allowing five minutes for this also.

(*a*) "*A mother sent her boy to the river and told him to bring back exactly 7 pints of water. She gave him a 3-pint vessel and a 5-pint vessel. Show me how the boy can measure out exactly 7 pints of water, using nothing but these two vessels and not guessing at the amount You should begin by filling the 5-pint vessel first. Remember you have a 3-pint vessel and a 5-pint vessel, and you must bring back exactly 7 pints.*"

Same formula for (*b*) and (*c*).

Credit if two of the three problems are solved correctly, each within five minutes.

Vocabulary.

"*I want to find out how many words you know. Listen; and when I say a word, you tell me what it means. What is an orange?*" etc. If subject can read, let him see the words on the vocabulary card. Continue list till 8 to 10 successive words are missed. If subject thinks formal definition is required, examiner may say: "*Just tell me in your own words; say it any way you please. All I want is to find out whether you know what a——— is.*" Examiner may ask subject to explain what he means if it is not clear.

1 orange	17 guitar	33 skill	49 shrewd
2 bonfire	18 mellow	34 misuse	50 forfeit
3 roar	19 pork	35 insure	51 peculiarity
4 gown	20 impolite	36 stave	52 coinage
5 tap	21 plumbing	37 regard	53 mosaic
6 scorch	22 outward	38 nerve	54 bewail
7 puddle	23 lecture	39 crunch	55 disproportionate
8 envelope	24 dungeon	40 juggler	56 dilapidated
9 straw	25 southern	41 majesty	57 charter
10 rule	26 noticeable	42 brunette	58 conscientious
11 haste	27 muzzle	43 snip	59 avarice
12 afloat	28 quake	44 apish	60 artless
13 eyelash	29 civil	45 sportive	61 priceless
14 copper	30 treasury	46 hysterics	62 swaddle
15 health	31 reception	47 mars	63 tolerate
16 curse	32 ramble	49 repose	64 gelatinous

65 depredation	74 embody	83 selectman	92 theosophy
66 promontory	75 infuse	84 sapient	93 piscatorial
67 frustrate	76 flaunt	85 retroactive	94 sudorific
68 milksop	77 declivity	86 achromatic	95 parterre
69 philanthropy	78 fen	87 ambergris	96 homunculus
70 irony	79 ochre	88 casuistry	97 cameo
71 lotus	80 exaltation	89 paleology	98 shagreen
72 drabble	81 incrustation	90 perfunctory	99 limpet
73 harpy	82 laity	91 precipitancy	100 complot

NOTE.—To get the entire vocabulary, multiply the number of correct definitions by 180.

(b) ADAPTATION FOR USE WITH ILLITERATES.

In the examination of an illiterate subject only those tests in each year-group which are starred in the record booklet should be given. When only the starred tests are given, credits should be assigned in accordance with the following table:

Years 3 to 10	3 points (or months) per test.
Year 12	5 points (or months) per test.
Year 14	6 points (or months) per test.
Year 16	7½ points (or months) per test.
Year 18	9 points (or months) per test.

The probable error of a mental age score derived by the scale as thus abbreviated is approximately 7½ months, as contrasted with a probable error of less than 6 months for the unabbreviated scale as applied to unselected adults.

(c) EXPRESSING AND INTERPRETING RESULTS.

As this is an age scale, the responses are ordinarily scored in terms of months. They may also be scored in terms of points by those who prefer this method. When this is done, each test is given a point value corresponding to its value in months. A subject is credited with the full number of points for each test below the year-group actually given, *and in addition with 24 points for years 1 and 2.* He is also credited with the actual number of points scored in the year-groups given. It is thus possible to score as high as 30 points (months) in year XVI and 36 in year XVIII, making a total possible score of 234 points, or a mental age of 19 years, 6 months. If fewer than the regular number of tests are used from a given year-group, each test should be assigned a proportionately higher point value. If more than the regular number are used, each test should be assigned a proportionately lower value. Where half credit is allowed for a response, half the number of points is given.

The results of Stanford-Binet examinations are to be expressed in the following ways: (1) Mental age in years and decimal of a year; (2) letter rating.

Mental ages correspond to the letter ratings as follows:

A	18. 0–19. 5
B	16. 5–17. 9
C+	15. 0–16. 4
C	13. 0–14. 9
C−	11. 0–12. 9
D	9. 5–10. 9
D−	Below 9. 5

Subjects obtaining a score of 10 years (120 points) or more may ordinarily be recommended for regular military training; subjects between 8 and 10 years (96 to 119 points) should be considered for assignment to service organization or Development Battalion; subjects below 8 years (96 points) should be considered for discharge.

Grade E should be given to all men who are recommended by the examiner for discharge, Development Battalion, or service organization, *and to such men only.* All men whose intelligence is deemed satisfactory for regular military duty shall be given rating of D− or higher.

4. PERFORMANCE SCALE EXAMINATION.

(a) PROCEDURE.

Test 1, the ship test.

Materials.—A frame and 10 pieces which, when properly fitted together, form a ship.

Directions.—Examiner shows subject the frame with the pieces properly fitted therein, and says, "*This is a picture of a ship. Look at it carefully.*" Subject is allowed to look at the picture for 10 seconds; then examiner withdraws the picture from view, removes the pieces, and presents the empty frame and the pieces arranged as in figure H. The pieces may be numbered on the edge toward examiner from left to right to indicate their positions. The frame is next the subject. Examiner says, "*Put these pieces in the frame as quickly as you can so as to make the ship you just saw.*"

Subject is given *five minutes*, and is allowed to make any changes he wishes within the time limit; but examiner must not suggest the changes.

Scoring.—A score of one is allowed for each of the lower or upper pieces, if placed in the lower or upper portion of the frame—i. e., the "water" pieces at the bottom and the "sky" pieces at the top, except that no credit is given for an inverted piece. In addition to this, a score of one is given to each piece that is in its correct relative position in the upper or lower row. The maximum score for accuracy is thus 20 points.

If the score for accuracy is 18 or more, additional credit is given for time as follows:

Time.	Credit.	Time.	Credit.
0–20	5	51– 80	2
21–30	4	81–120	1
31–50	3	121–300	0

The maximum raw score is therefore 25 points.

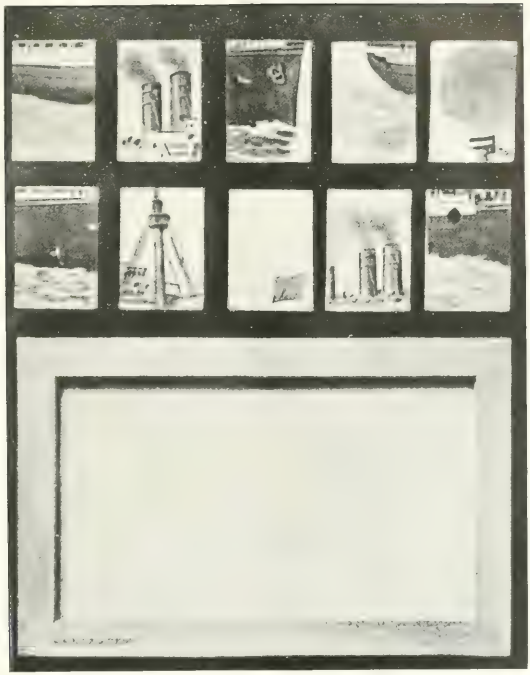


Fig. H.—SHIP TEST WITH PIECES ARRANGED FOR SUBJECT TO PLACE IN FRAME.

Test 2, manikin and feature profile.

Materials.—(*a*) Six pieces which when put together represent the conventional figure of a man.

(*b*) Eight pieces which when put together form the figure of a human head.

Directions.—(*a*) The pieces are placed before subject, as in figure I. Each arm and each leg is placed at the opposite side of the body from the place where it fits. Examiner says, "*Put this together as quickly as you can.*"

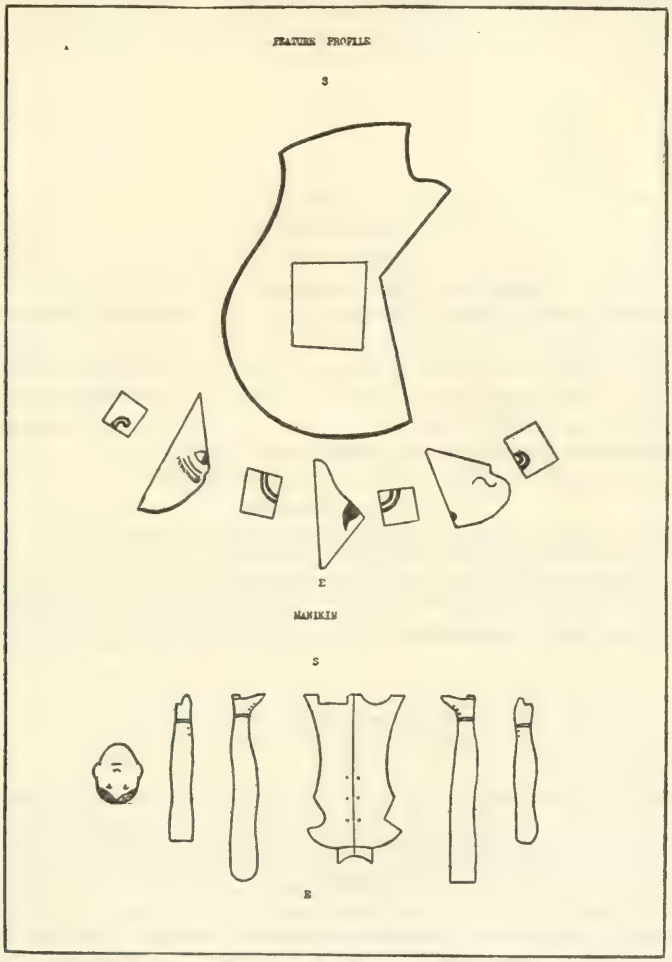


Fig. I.—Manikin and feature profile pieces arranged for subject to replace.

(*b*) The pieces are placed before subject, as in figure I. The three pieces forming the face are separated from each other by the four pieces forming the ear. Examiner says, "*Put this together as quickly as you can.*"

The time limit for (*a*) is *two minutes*, for (*b*) *five minutes*. Spontaneous changes are allowed within the time limit. Subject is not told what the pieces make. If subject scores 3 or less on (*a*), examiner fits it together correctly and then goes on to (*b*). If the score on (*a*) is 0, (*b*) need not be given.

Scoring.—The end products are scored as follows:

	Points.
(*a*) One point for each piece in correct poition; i. e., for a perfect performance	5
One or both arms not exactly fitting joints	4
One reversal of arms *or* legs	3
Two reversals, arms and legs	2
Legs and arms interchanged, or any other result that looks like a man	1
Poorer than this, not resembling a man	0

(*b*) One point for each face piece in the correct position, 1 point for a partly correct ear—i. e., one, two, or three pieces in the correct place—and 2 points for a completely correct ear, making a total for accuracy of 5 points.

Credit is given for time only if the score for accuracy is on (*a*) 4 or 5 points, on (*b*) 5 points. Then credit as follows:

Time. (*a*)	Time. (*b*)	Credit.
0– 10	0– 30	5
11– 15	31– 40	4
16– 20	41– 60	3
21– 30	61– 80	2
31– 50	81–120	1
51–120	121–300	0

The maximum raw score is, therefore, 20 points on (*a*) and (*b*) together.

Test 3, cube imitation.

Materials.—(1) Four 1-inch cubes fastened 2 inches apart to a wooden base. Both cubes and base are painted a dark red. The cubes are numbered 1 to 4 from right to left. (2) A fifth cube of the same size unattached and similarly painted. (3) Ten imitation problems (*a* to *j*), as printed on the record sheet.

Directions.—Examiner places the cube board before subject, with the numbered side of the cubes directed away from him, and says, "*Watch carefully and then do just what I do.*" Examiner next with the fifth cube taps the attached blocks in a predetermined order, as, for example, in (*a*) 1—2—3—4, at the rate of *one per second.* He now lays the tapping cube down before subject, midway between the second and third cubes, but nearer to subject than the cube board, and says, "*Do that.*" If in the first problem subject taps 4—3—2—1 instead of the reverse, examiner credits the response and says, "*No, begin here*" (pointing to 1).

Parts (*b*) to (*j*) are given in order unless subject fails in 5 successive parts. In this event the test is discontinued. It is important that the rate of tapping should not be faster than one per second.

Scoring.—The responses are recorded as right (+) or wrong (−); and 1 point is given for each success. The maximum raw score is 10 points.

Test 4, cube construction.

Materials.—(1) A block of wood (model 1) 1 by 3 by 3 inches, painted a dark red on the four sides, not on the upper or lower surfaces, and cut to a depth of 2 mm., so that it closely resembles a composite of 9 small cubes. (2) Nine 1-inch cubes necessary for the construction of model 1, four painted on two sides, four painted on one side, and one not painted. (3) A block of wood (model 2), same size as model 1 but painted on the top as well as the four sides. (4) Nine 1-inch cubes necessary for construction of model 2. (5) A 2-inch cube (model 3), unpainted and cut on the six surfaces so that it looks like a composite of eight small cubes. (6) Eight 1-inch cubes painted on three sides for the construction of model 3.

Directions.—Examiner presents model 1, and says, "*You see this block. Notice that it is painted on the sides but not on the top or the bottom; and you see these smaller blocks* (examiner presents blocks described under (2), above) *partly painted and partly unpainted. These nine blocks can be put together so as to make one just like this.*" Examiner puts the blocks together, pointing to the painted surface or surfaces of each cube as he fits it in position.

(*a*) Examiner then presents the *same model* and blocks in irregular order, and says, "*Now, you fit the blocks together so as to make one like this.*"

(*b*) Examiner now presents model 2 and the blocks for its construction and says, "*Now, put these blocks together so as to make one just like this. Notice that it is painted on the edges and on the top but not on the bottom.*"

(*c*) Examiner presents model 3 and says, "*You see this block; notice that it is not painted anywhere; and you see these smaller blocks* (present blocks described under (6) above) *that have three sides painted and three not painted. Now, I want you to fit these eight blocks together so as to make one just like this. Remember, it is not painted on the bottom, top, or sides.*"

With a stop watch examiner takes time in seconds for assembling the cubes. He also counts the number of moves. A move is to be understood as *a placement in some position designed to complete the structure.* If parts of a structure are assembled separately, putting such parts together does not count an additional move. If the blocks are fitted together in the hand, the moves are counted just as they are if assembled on the table. Turning a block over or otherwise shifting its position in the structure is counted a move, but turning it over in the fingers, picking it up, and placing it upon the table are not to be counted moves. Subject is penalized sufficiently for such behavior by the longer time.

Time for work on each part, *two minutes.* If subject assembles blocks before time is up, allow spontaneous corrections, counting extra time and additional moves. Each block changed counts one move as before. The time should be taken when subject indicates verbally *or otherwise* that he has finished.

Scoring.—No credit is to be given for time, if the blocks are not all assembled; but if they are, credit as follows:

(a) Seconds.	(b) and (c) Seconds.	Credit.
1– 10	1– 20	5
11– 25	21– 30	4
26– 50	31– 50	3
51– 80	51– 80	2
81–120	81–120	1

No matter whether subject has finished or not, count each misplaced block as three additional moves and each unassembled block as six additional moves, and credit total moves as follows:

(a) and (b) Moves.	(c) Moves.	Credit.
9	8	5
10–11	9–10	4
12–15	11–15	3
16–25	16–25	2
26–50	26–50	1

Note that the minimum number of moves is nine for (*a*) and (*b*), and eight for (*c*); that no credit is given for over 50 moves; and that the maximum raw score is 10 points for each part, or a total of 30.

Test 5, form board.

Materials.—See illustration of problems, figure J, for identification of the materials.

Directions.—Examiner places the board before subject, arranged as shown in "demonstration." E and S in this figure indicate the relative positions of examiner and subject. Examiner says, "*These blocks can be changed around so as to make room for this extra square, like this.*" Examiner proceeds to solve the problem in the minimum number of moves, making sure that subject is attending.

(*a*) Examiner now presents the board arranged for problem A, saying, "*Without making any more moves than you have to, change these blocks around so you can find a place for the extra square* (pointing to square). *Don't have any blocks left over. Ready—go ahead.*"

(*b*) Examiner now presents the board arranged for problem B, saying, "*I want you to change these blocks around so you can find places for these two extra squares* (pointing to them). *Ready—go ahead.*"

(*c*) Examiner presents the board arranged for problem C, saying, "*Now I want you to change the blocks around so you can find places for these four extra blocks. Ready—go ahead.*"

Examiner records the time in seconds from start to finish, and counts the number of moves. *A move is to be understood as placing or trying to place a block in some position on the board.* Taking a block out of position, and placing a block upon the table are not counted as moves.

Time for work on (*a*) and (*b*), *two minutes each;* on (*c*), *three minutes.* If (*a*) is not solved in the time allowed, examiner demonstrates that correct solution before going on to (*b*).

Scoring.—If a problem is not solved within the time limit, score that part 0; but *if a correct solution has been accomplished*, give credit for time and for moves as follows:

MOVES.				TIME.		
(a)	(b)	(c)	Credit.	(a) and (b)	(c)	Credit.
----	----	8	5	0– 10	0– 20	5
----	----	9	4	11– 20	21– 40	4
3	5	10–11	3	21– 40	41– 70	3
4	6	12–14	2	41– 70	71–110	2
5–7	7–10	15–20	1	71–120	111–180	1

Note that the minimum number of moves for problems (*a*), (*b*), and (*c*) is 3, 5, and 8, respectively, and that the maximum raw scores are 8, 8, and 10, or a total of 26 points.

The examiner will find it advantageous to make a diagram of the arrangement of the blocks for each problem (as in fig. J), and paste it on the screen between him and the subject. He can then copy the pattern on the board out of view of the subject, and with a little practice, can do it very expeditiously—often in less than 30 seconds.

Test 6, designs.

Materials.—The five plates of designs on page 199. Examiner provides subject with pencil and paper.

Directions.—The designs are given in order, (*a*), (*b*), (*c*), (*d*). Formula for (*a*) and (*b*): "*I am going to show you a drawing. You will have just ten seconds to look at it; then I shall take it away and let you draw it from memory. Don't begin to draw till I say 'go.'*"

Formula for (*c*) and (*d*): "*This time I shall show you two drawings. You will have only ten seconds to look at them, then I shall take them away and you are to draw them both from memory.*"

Before exposing the designs, examiner says: "*Ready; look closely.*" When designs are removed, examiner says: "*Go.*" Designs are exposed with greatest length of page horizontal, and with front of Guide toward examiner. The time limit is *2 minutes*, but subject is not stopped or penalized if he appears to have the correct plan and is carrying it out. If the raw score on (*a*), (*b*), and (*c*) together is less than 3, (*d*) need not be given.

DEARBORN FORM BOARD No. 3.

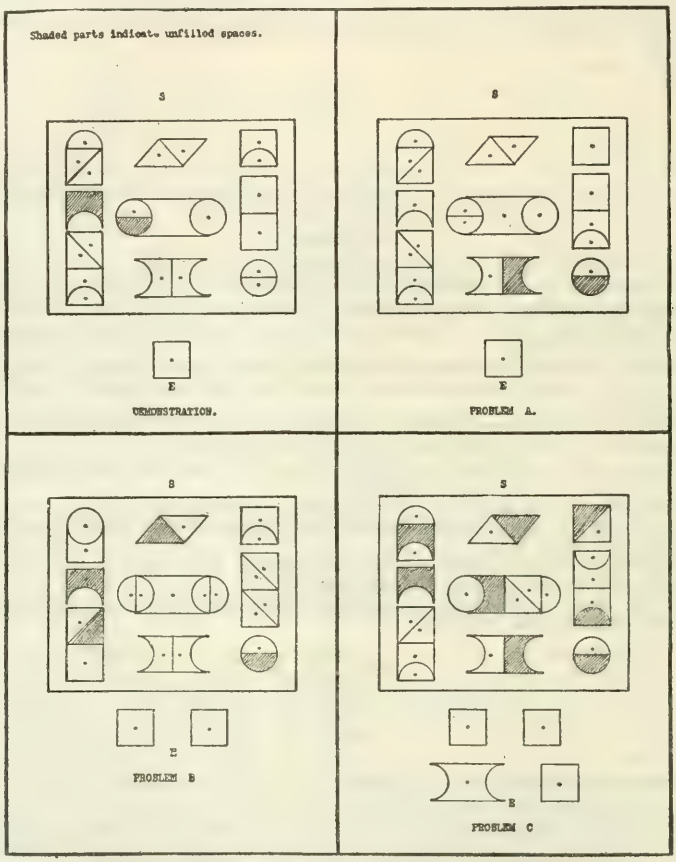


Fig. J.—Form board with pieces arranged in various problems for subject to replace.

Scoring.—Emphasis is put upon reproduction of the plan of the designs rather than upon the neatness of the drawing. Credit as follows:

(*a*) 1. Two lines crossed, four flags 1
2. Correctly facing one another 1
3. Accuracy (lines nearly equal, nearly bisected, nearly at right angles; flags nearly square) 1
Total possible points, 3.

(*b*) 1. Large square with two diameters 1
2. Four small squares within a large square 1
3. Two diameters in each small square 1
4. Sixteen dots, each alone in a small square 1
5. Accuracy of proportion (width of spaces around the four small squares between $\frac{1}{4}$ and $\frac{1}{2}$ the width of the 16 smallest squares) 1
6. If design is complete but with superfluous squares or lines, count only 3 points.
Total possible points, 5.

See Fig. K for some common variations.

(c^1) A rectangle with approximately vertical lines
1. Dividing it approximately equally (into not over 6 parts)..... 1
2. Dividing it into 4 parts..... 1
Total possible points, 2.

(c^2) A rectangle with approximately vertical lines
1. Dividing it into parts at least 3 of which diminish in size to the right..... 1
2. Dividing it into 6 parts..... 1
Total possible points, 2.

(d^1) 1. Large diamond with small diamond inside crosswise with its vertices approximately coincident with obtuse angles of large diamond; or large diamond with small diamond inside with sides approximately parallel to those of large diamond (alternative to 1)..... 1
2. A third diamond with its vertices approximately coincident with the obtuse angles of the second..... 1
3. Accuracy (the proper lines very nearly parallel and the acute angles of diamonds all nearly equal)..... 1
Total possible points, 3.

(d^2) 1. A large square with sides approximately equal, and small square inscribed..... 1
2. A third square inscribed in second square approximately bisecting sides of second square..... 1
Total possible points, 2.

The maximum raw score for entire test, 17 points.

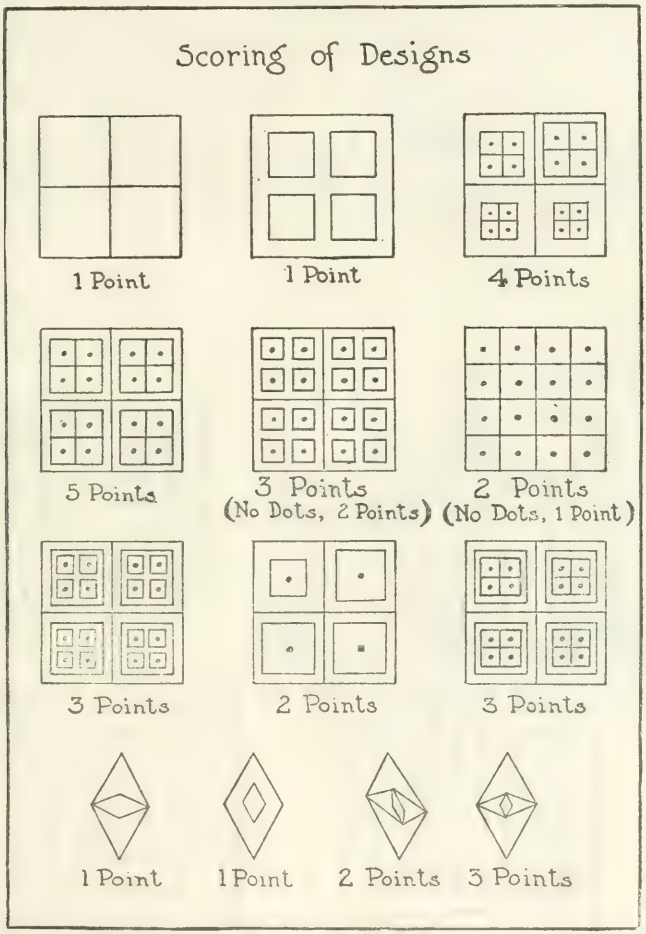


Fig. K.—Score values for various types of performance on designs test.

Test 7, the digit symbol test.

Materials. See page 277.

Directions.—The part of the first row marked *sample* is used for demonstration. Examiner says, "*You see these numbers and the little mark below each number* (pointing to the row at the top of the page). *Now, I want you to put in each one of these squares* (pointing to the empty squares in the three rows) *the little mark that ought to go there, like this: Below 2 put this little mark* (beginning at 2 in the sample); *below 1, this; below 3, this;*" etc. After doing five of the samples examiner pauses and asks, "*Now, what should I put here?*" (indicating the next empty square). If subject answers correctly, examiner finishes the samples himself; if subject fails, examiner tells him and repeats the question with the next sample. After finishing the demonstration, examiner says: "*Now, you begin here and fill as many squares as you can before I call time.*"

Time, *2 minutes.*

Scoring.—The score is the number of squares filled correctly in the time limit. Maximum raw score, 67 points.

Test 8, the maze.

Materials.—The four mazes (*a*), (*b*), (*c*), and (*d*) on page 278 and demonstration maze on page 277.

Directions.—Examiner shows subject demonstration maze and says, "*You see these lines. Now I am going to begin here at S and mark with my pencil the shortest way out without crossing any lines. Watch carefully.*" Examiner places sheet so that the bottom of the maze is toward subject, and traces the way out, calling attention to the possibility of taking the wrong path at one or two of the critical points. Examiner says, "*You see, if I should go this way, it would not be the shortest way out. I should have to turn back.*" Examiner then presents test maze (*a*) on page 278 and says: "*Now, with your pencil begin at S and mark the shortest way out as quickly as you can. Do not cross any lines and do not turn back unless you have to. Ready—Go ahead.*"

If subject crosses a line, not through carelessness, examiner says, "*You have crossed a line here. You see it is not an open space. Begin here* (indicating a point on the pencil mark just before it crossed the line) *and see if you can find a path out without crossing any lines.*" In scoring, subject is penalized 1 point for each line crossed as above.

Mazes (*b*), (*c*), and (*d*) should be presented in the same way as (*a*) except that no further demonstration is allowed. Time limit for each maze, *2 minutes.* If the score on (*a*) and (*b*) is 0, the test may be discontinued.

Scoring.—Time is recorded in seconds from start signal to successful exit. If this occurs within the time limit, credit for time is given for each maze as follows:

Time.	Credit.
0– 20	3
21– 40	2
41– 70	1
71–120	0

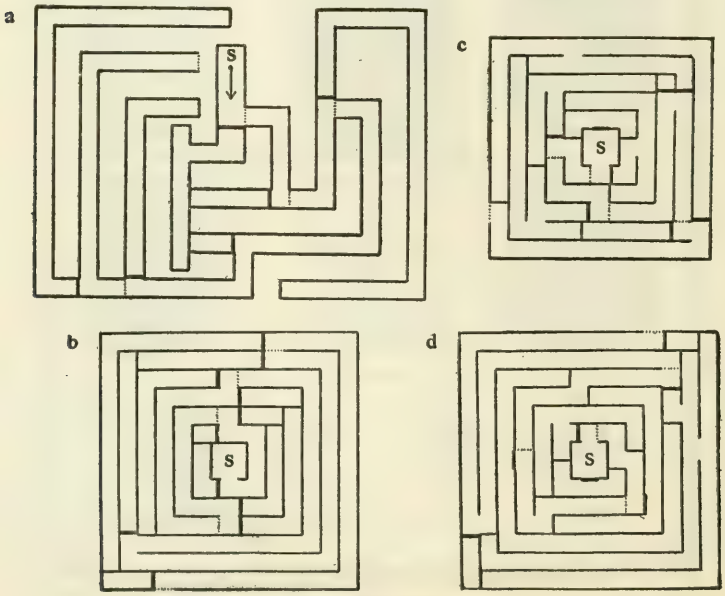


Fig. L.—Key mazes.

MATERIALS FOR THE PERFORMANCE SCALE, PICTURE ARRANGEMENT TEST (TEST 9), SHOWING THE DEMONSTRATIONAL SERIES X AND THE FOUR TRIAL SERIES A, B, C, D, ALL ARRANGED IN CORRECT ORDER.

The series were presented to the subject out of order; see directions for test 9, page 189.

Whether subject finishes in the time limit or not, credit is given for the degree of success he has attained as follows: Each maze is divided into five successive steps, which are indicated by dotted lines crossing the path of the maze in the key maze, figure L. A credit of 1 point is given for each step successfully accomplished; i. e., for each imaginary dotted line crossed, making a total of 5 points for each maze. The openings of all blind alleys are indicated by heavy black lines across the path of the maze. A penalty of 1 point is given for each imaginary heavy line crossed. Thus the *score equals the number of dotted lines crossed minus the number of heavy lines crossed, and maze lines crossed not through carelessness* (see above). Any negative score thus obtained counts as zero. (No matter how many times any dotted line or heavy line is crossed, only one credit or penalty is given therefor.)

Maximum raw score, 32 points.

Test 9, picture arrangement.

Materials.—Five sets of "Foxy Grandpas" pictures, one set for demonstration, and four for actual tests.

Directions.—Examiner presents demonstrational set (*x*) in a row in the order 4—2—6—3—1—5 and says, "*These pictures tell a funny story if they are placed in the right order.*" Examiner then proceeds to arrange the pictures properly, telling the story as he does so, and calling subjects' attention to the proper sequence of the important details. He next removes this set, and presents set (*a*), saying, "*Now see how quickly you can change these pictures around so as to make them tell a good story.*" Subject is not told if he is wrong, but examiner goes on to the next set. Sets (*b*) to (*d*) are presented in the same way. The sets are shown in a row in the order 4—2—6—3—1—5 and 5—1—3—6—2—4 alternately. The time limit for each set is *3 minutes.*

Scoring.—Examiner records the time and the arrangement for each set; and gives a credit of 1 point for each pair of pictures in correct juxtaposition—i. e., a maximum of 5 points for accuracy for each set. When, however, the error in arrangement consists only in the reversal of one, two, or three juxtaposed pairs, a penalty of 1 point is given for each such reversal. Thus credit of 4 points is obtained for arrangement 1—2—4—3—5—6, which would receive only 2 points credit for correctly juxtaposed pairs.

No credit is given for time unless the arrangement is correct. Then credit as follows:

Time.	Credit.
1– 30	3
31– 60	2
61–120	1
121–180	0

Maximum raw score, 32 points.

Test 10, picture completion.

Materials.—Two boards upon which are depicted successive scenes from the day's activity of a boy; and 60 small blocks from which are selected the pieces to complete the pictures.

Directions.—The boards are placed before subject, part 2 at his right. The 60 small pieces are placed above the boards in the box arranged in a *predetermined order*[1] as indicated in the box. In this arrangement ambiguous pieces are located in the same area. Examiner says, "*Here is a picture—it begins here* (pointing to demonstration picture) *where the boy is getting dressed. It shows the same boy—remember, the very same boy—doing one thing after another during the same day.* (Examiner points along first row and then along second to indicate the sequence in which the pictures come.) *You see in each picture a piece is missing. Here are a lot of small pieces. They go into the empty places. You are to pick out the piece that you think is needed, that is best to make the picture right. For example, what is gone here?*" (pointing to demonstration picture). If subject answers correctly, examiner says, "*That's fine. Now see if you can find the best piece for each of the other places.*" If subject does not answer correctly, examiner finds the piece for him, explains why it is right, and then says, "*Now see, etc.*" as above. Examiner gives no help after the first explanation, but subject is allowed to change pieces if he wishes. When subject indicates that he has finished as well as he can, time is recorded. The time limit is *10 minutes.*

Scoring.—No credit is given for time, but the very slow are indirectly penalized by not finishing in the time limit. The scoring of the performance is indicated in the accompanying table. When a square is left unfilled, the score for that item is 0. Negative score on the entire test counts as zero.

Maximum raw score, 100.

[1] See plate 19, opposite page 190. The pieces are numbered in order from left to right. The pieces of the top row run from 1 to 10; of the second row, from 11 to 21, etc. The proper numbers are stamped on the back of the pieces. Proper location for each piece in the box is indicated by an indentical number.

Scoring of completion test.

[The value of *minus 5* is to be given to all placings where in the table below no numbers are inserted. These represent the marked absurdities.]

VALUE OF PIECES IN PICTURES.

Pieces.	I	II	III	IV	V	VI	VII	VIII	IX	X
1					2					**12.5**
2	0	0	1	2		0	0	0	0	0
3							1	**15**		
4					0					6
5							0	0	0	
6	0			0						
7	0	0	1	2		0	0	0	0	0
8	**6.5**			2						
9		5	0		0					0
10	0			1						
11	1			8						
12		0			0					1
13		5	0		3					1
14							1	6		
15			1			1	0	0	0	
16							0	0	0	
17							1	6		
18			0			**9**		0		
19		2			0					0
20										
21		0			1					0
22					2					6
23	1			**17**						
24					0					6
25							2	0	0	
26			0			4	0	0	0	
27		5	0		1					0
28			0			**4**	0	0	0	
29										0
30	2			2						
31	1			8						
32		0			**7**					0
33							1	7		
34							**5.5**	0	0	
35			**12.5**		0	0				0
36			1			2	0	0	0	
37		0	4		0	0				0
38										0
39							0	0	1	
40										1
41		0			2					0
42	0			2						
43		0			2					0
44			1			1	0	0	0	
45	3			2						
46	0	0	6	0	0	0				0
47		5	0		1					2
48							0	0	**5**	
49		**10**	0		1					2
50	0						0	0	1	
51	0	0	1	2		0	0	0	0	0
52	1			8						
53	0	0	1	2		0	0	0	0	0
54							0	0	0	
55			6		0	0				0
56							2	0	0	
57							0	0	1	
58	0	0	1	2		0	0	0	0	0
59							0	0	2	
60		0	2		0	0				0

(b) PROCEDURE FOR NON-ENGLISH-SPEAKING SUBJECTS.

Examiner should take care that his directions do not appear too artificial. For this reason he should not always remain absolutely silent. He should try to use whatever words are intelligible to his subject. "No," "Yes," "Hurry," etc., can be used in most cases; and even when subject does not understand, it is often better for examiner to speak as well as gesture. The aim here is only to make the instructions intelligible apart from the language used.

Test 1, the ship test.

Examiner shows subject the frame with the pieces properly fitted therein. After subject looks at picture for 10 seconds, examiner withdraws picture, removes pieces and presents the empty frame and the pieces arranged as in figure 1. Examiner points in order to subject, to the pieces, to the frame, and nods affirmatively. If subject does not understand, examiner repeats.

Test 2, manikin and feature profile.

Examiner places pieces before subject as previously described. Then points to subject, to pieces, nods affirmatively, and sweeps hands together over pieces to indicate that they are to be assembled. This may be repeated. If subject does not understand, or if pieces are not properly assembled in the time limit, examiner demonstrates part (*a*) and goes on to (*b*).

Test 3, cube imitation.

Examiner places the cube board before subject as previously described; then taps the first imitation problem slowly, puts down the tapping cube, points to subject, and nods affirmatively. If subject fails to understand, examiner repeats; if he begins at the wrong end, examiner shakes head negatively, points to the first cube, and repeats the problem. Examiner should make sure he has subject's attention before tapping any problem.

MATERIALS FOR PERFORMANCE SCALE, PICTURE COMPLETION TEST (TEST 10), 60 PIECES ARRANGED IN BOX IN THE MANNER IN WHICH THEY ARE PRESENTED TO THE SUBJECT FOR FITTING IN THE BOARD (CF. PLATES 20 AND 21).

MATERIALS FOR PERFORMANCE SCALE, PICTURE COMPLETION TEST (TEST 10), LEFT HALF OF BOARD.

MATERIALS FOR PERFORMANCE SCALE, PICTURE COMPLETION TEST (TEST 10), RIGHT HALF OF BOARD.

Test 4, cube construction.

(*a*) Examiner presents model 1 and the corresponding blocks, points to bottom, top, and sides of model; then places it upon the table and assembles the blocks rather slowly, turning each block over in the fingers and pointing to painted and unpainted sides. Examiner now presents the same model and the blocks in irregular order, then points in order to subject, to the model, to the blocks, and nods affirmatively. Examiner repeats, if subject does not understand.

(*b*) Examiner presents model 2 with the nine blocks for its construction; shows subject bottom, top, and sides of model; then places it upon the table, points to subject, to the model, to the blocks, and nods affirmatively. Examiner repeats gestures if subject does not understand.

(*c*) Examiner presents model 3, turns it over slowly, showing each side, presents blocks, picks up a block, points to painted side, shakes head, points to unpainted side, nods, puts down block, points to subject, to model, and to blocks, nods affirmatively.

Test 5, form board.

Examiner places board before subject as previously described, points to square and to empty spaces, and proceeds slowly to change blocks and put in square. Examiner next removes board, rearranges it for problem (*a*), and again presents it to subject. He then points to subject, to square, and to board, nodding affirmatively. If subject does not understand, examiner repeats gestures; and if problem is not solved in the time limit he again demonstrates the correct solution and passes on to (*b*). Problems (*b*) and (*c*) are presented in the same way except that they are not demonstrated in case of subject's failure.

Test 6, designs.

Examiner shows subject demonstrational design (*x*) for 10 seconds. Then he takes it away and draws is for subject. He now shows test design (*a*) for 10 seconds; then takes it away, gives subject pencil and paper, points to subject, to paper, nods affirmatively. If subject does not respond, examiner draws it for him, then passes on to (*b*). Designs (*b*), (*c*), and (*d*) are presented in the same way except that examiner does not demonstrate further.

Test 7, digit symbol.

Examiner shows subject the record sheet, points to blank below 2 in the sample, then to symbol for 2 at top of page, writes in symbol, proceeds in the same way with the other parts of the sample, then gives subject pencil, points to space below 3 in the test, and nods affirmatively.

Test 8, the maze.

Examiner shows subject demonstration maze (*a*), and with his pencil proceeds to trace the shortest way out. At critical points he hesitates, moves pencil in wrong direction without marking, shakes his head, and continues to work in the right direction. He next presents test maze *a*, gives subject pencil, points to starting point and to exit of maze, and nods affirmatively. If subject fails to understand, examiner demonstrates again with maze *a* and passes on to (*b*). Mazes (*b*), (*c*), and (*d*) are presented in the same way, but no more demonstration is given.

Test 9, picture arrangement.

Examiner presents demonstrational set and allows subject to see it for about 15 seconds. Then, making sure that subject is attending, he slowly rearranges the pictures and points to each one in succession, attracting subject's attention especially to the sequence of important details. Next examiner removes these pictures and presents set (*a*), points to subject, and moves his hand about the pictures to indicate that they are to be arranged. If subject does not understand, examiner shows him the proper arrangement and then goes on to set (*b*). Sets (*b*), (*c*), and (*d*) are presented in the same way as (*a*), except that no further demonstration is given if subject fails.

Test 10, picture completion.

Examiner places material before subject as previously described. He then slowly points to the same boy in each of the pictures in succession to indicate the proper sequence of events. He next returns to the demonstrational picture, points to dressed and undressed foot, and to empty space. Next he looks leisurely over the small blocks, tries the slipper or the low shoe in the space, points to dressed foot, and shakes his head negatively. Then he puts in the correct piece showing satisfaction with result. Finally, he points in order to picture 1, to subject, to small blocks, and to the empty space in the picture, and nods affirmatively. If subject does not understand, examiner repeats.

(c) DIRECTIONS FOR USING RECORD BLANK.

In general, the subject is given credit for both speed and accuracy or degree of success; and the record blank is designed to convert time and accuracy measurements into points of credit without delay or inconvenience.

As soon as subject has completed tests 1, 2, 4, 5, 8, or 9, or any part of any one of them, examiner checks the space containing the figures which include the subject's time. In tests 1, 2, and 9, he next scores the performance for accuracy; and, if the conditions for crediting time are fulfilled, he adds the credit below the time checked to the credit for accuracy and records the sum in the column marked "score." In tests 4 and 5, examiner also checks the space which includes the number of moves; and, if the conditions for crediting are fulfilled, he adds the credit below

time checked to the credit below moves checked and records the sum in the column marked "score," as above. In test 8 time is checked and the credit for time added to the credit for success, etc., as before. The abbreviation T. L. in these tests means "time limit"; and this space is checked only when subject is actually stopped before the test or part of the test is completed.

In test 3, examiner records the response only when it is incorrect; but always writes + or − in the proper column. In test 10, the number on the back of the block selected for a given picture is written below the number of the picture, and the credit for that part is written in the next space below. If no block is selected for any given picture, examiner leaves that space blank. Tests 6 and 7 require no explanation.

The score for each part of tests 2, 4, 5, 8, and 9 are written in the column marked "score"; and then these part scores are totalled below the heavy line, except in test 2, where the total for the two parts is merely written at the foot of the space for score. In all other tests only the total score for the test is written in the "score" column.

(d) DIRECTIONS FOR WEIGHTING PERFORMANCE-SCALE SCORES.

The raw score for each of the 10 tests is converted into a weighted or equalized score, which is entered on the performance-scale record blank and on the psychological record card in the column headed: "Wtd. score." This weighted score is obtained by means of the accompanying table. In the table all the possible raw scores for each test are listed in columns bearing the number of the test. The weighted scores corresponding are listed in the columns under the letter W at either side of the page. For example, to convert a raw score, in test 1, into a weighted score, look at the column under figure 1, find the raw score, and take the score in either column W which is on the same line. Thus, the weighted score corresponding to the raw score 19, in test 1, is 13. The weighted score corresponding to the raw score 35, in test 7, is 15, etc.

W.	1	2	3	4	5	6	7	8	9	10	W.
0	0– 3	0– 1	0	0– 1	0–2	0	0	0– 3	0– 1	0	0
1	4– 6	2	.....	2	3–5	1	1– 4	4– 7	2	.....	1
2	7– 9	3	1	3	6–7	2	5– 7	8–10	3	.....	2
3	10–11	4	.....	4	8	.....	8–10	11–13	.....	.....	3
4	12	5	.....	5	9	3	11–13	14–15	4	1– 2	4
5	13	6	2	6	10	.....	14–15	16	.....	3– 5	5
6	14	.....	.....	7	11	4	16–17	17	5	6– 8	6
7	15	7	.....	8	.....	.....	18–19	18	.....	9– 11	7
8	16	8	.....	9	12	5	20–21	19	6	12– 14	8
9	17	.....	.....	.....	.....	.....	22–23	.....	.....	15– 17	9
10	.....	9	3	10	13	.....	24–25	20	7	18– 20	10
11	18	.....	.....	11	14	6	26–27	.....	8	21– 23	11
12	.....	10	.....	.....	.....	.....	28–29	21	9	24– 26	12
13	19	.....	.....	12	15	7	30–31	.....	10	27– 30	13
14	.....	11	.....	13	.....	.....	32–33	22	11	31– 33	14
15	20	.....	4	.....	16	8	34–35	.....	12–13	34– 37	15
16	.....	12	.....	14	.....	.....	36–37	23	14–15	38– 40	16
17	21	.....	.....	15	17	9	38–39	.....	16–17	41– 44	17
18	.....	.....	.....	.....	.....	.....	40–41	24	18	45– 47	18
19	.....	13	5	16	18	10	42–43	.....	19	48– 50	19
20	22	.....	.....	17	.....	.....	44–45	.....	20	51– 53	20
21	.....	14	.....	.....	19	11	46–47	25	21	54– 56	21
22	.....	.....	.....	18	20	.....	48–49	.....	22	57– 59	22
23	23	15	6	19	.....	12	50–51	26	23	60– 62	23
24	.....	16	.....	20	21	.....	52–53	.....	24	63– 65	24
25	.....	.....	.....	21	22	13	54–55	.....	25	66– 68	25
26	.....	17	7	22	.....	.....	56–57	27	26	69– 71	26
27	24	18	.....	23	23	14	58–59	.....	27	72– 74	27
28	.....	.....	.....	24–25	24	.....	60–61	28	28	75– 77	28
29	.....	19	8	26–27	.....	15	62–63	29	29	78– 80	29
30	25	20	.....	28–30	25	16	64–65	30	30	81– 86	30
31	.....	.....	9	.....	26	17	66–67	31	31	87– 92	31
32	.....	.....	10	.....	.....	.....	.....	32	32	93–100	32

(e) AN ABBREVIATED PERFORMANCE SCALE.

If time does not permit the giving of the complete performance scale, a short scale selected from tests 1, 2, 3, 4, 6, 7, and 8 may be used. These tests must be given in the following order: 7, 6, 2, 4, 8, 1, 3 (or 3, 1). After each test is given examiner should compute the weighted score obtained by subject up to that point; and he may discontinue the examination after the first test, if the score is 14 or more; after the second, if it is 22; after the third, if it is 27; and after the fourth, if it is 32. The fifth test should be given if the score on four tests is less than 32; but only very rarely need more than five tests be used.

If subject is absolutely illiterate (whether American or foreign born), examiner should begin with test 6 instead of 7, and follow the same procedure.

If the examination is discontinued after the first test, subject should be rated D (C−, if the score is 21 or more) and as a rule recommended for regular service. If two or more tests are given, a final score should be obtained by finding the average for the tests actually given and multiplying by 10. The letter rating for this score can then be read from the table of norms for the *short scale*. If eight or more tests are given, the norms for the long scale should be used.

(f) EXPRESSING AND INTERPRETING RESULTS.

The results of the performance-scale examination should be expressed in the following ways: (1) Total weighted score; (2) letter rating; (3) mental age. The letter ratings corresponding to various scores and mental ages are as follows:

Complete scale.	Short scale.	Mental age.
3	2	4.5
4	5	5.0
6	8	5.5
9	12	6.0
17	17	6.5
30	24	7.0
41	33	7.5
52	42	8.0
62	53	8.5
72	67	9.0
91	86	9.5
114	108	10.0
135	127	10.5
153	144	11.0
166	158	11.5
175	169	12.0
183	179	12.5
189	188	13.0
195	197	13.5
201	205	14.0
208	214	14.5
216	223	15.0
223	232	15.5
230	241	16.0
237	250	16.5
244	259	17.0
251	267	17.5
258	275	18.0
268	283	18.5
290	291	19.0

Letter ratings should be assigned as follows:

	Complete scale.	Short scale.
A	260–311	275–308
B	240–259	250–274
C+	215–239	220–249
C	190–214	190–219
C−	150–189	145–189
D	90–149	85–144
D−	0– 89	0– 84

Grade E should be given to all men who are recommended by the examiner for discharge, Development Battalion, or service organization, *and to such men only*. All men whose intelligence is deemed satisfactory for regular military duty shall be given rating of D− or higher.

Subjects obtaining a score of 100 points or more (short scale) may ordinarily be recommended for regular military training; subjects obtaining 40 to 99 points should be considered for assignment to service organization or Development Battalion; those below 40 points should ordinarily be considered for discharge.

5. MECHANICAL-SKILL TEST.

The mechanical test is intended for use (1) in aiding decision in doubtful cases under individual consideration, and (2) as a special test of mechanical skill.

Materials.—One set mechanical test (Stenquist), single series I.

Directions.—Place the open box before subject with the cover toward him. Say, "*Here are some things that have been taken apart. You are to put them together. Begin here* (pointing to A); *take the parts and put them together so that the thing will work. Then go on to this one* (pointing to B); *then to the next, and so on. If you come to one that seems very hard, go on to the next one, and if there is time later try it again. The more things you get done the larger your score. Ready—Go.*"

Time for the entire test, *30 minutes.*

Scoring.—Give 10 points for the complete and correct assembling of each object. Total possible score, 100.

If the assembling of any object is only partially correct, give partial credit, according to the schedule. A list of the possible steps in the assembling is given for each object. Note in each case of partial solution which steps have been completed, and give credit for each step as indicated. The items indented are alternative reactions, therefore give credit of only one number of points from any group of indented items.

It will be noted in D, for example, that, failing only to screw cover on, subject gets but 6 points, while screwing the cover on counts but 1 point. The additional 3 points of penalty are for lack of "workability." If any step is omitted in the solution of any object except E, then item of "workability" is considered as lacking. In E, however, credit of 2 points is given for workability if the solution is correct except only 2 sides snapped or caps out of order, or both.

In case of the lock, the spring is properly inserted when the bend is hooked over the projection in the frame to prevent slipping. By "Spring inserted workably" is meant one of the three other workable positions in which it is possible to place the spring, but which make no use of the bend.

In the case of the mousetrap, by "in slot" is meant that the long arm of the spring is inserted in the slot of the U-shaped band. By "Right way," reference is made to the direction in which the U-shaped band snaps. A "weak snap" is occasioned by having the spring or springs inverted. If one spring is more nearly correctly inserted than the other, count best one; that is, give credit for the best spring, and for that only, except in the last case.

Schedule of scores.

A:	
Head inserted correctly	2
Nut screwed on—	
Properly between cross bars of handle	4
Otherwise	1
Score (wrench)	( )
B:	
Complete chain of singly joined links	3
One correct joint between links	2
Two correct joints	4
Three correct joints	6
Four correct joints	8
Score (chain)	( )
C:	
Thumb lever inserted in armholes—	
Below spring, arm of lever out	3
Above spring wrong side forward	8
Score (tube shut off)	( )
D:	
Thumb lever on pin either way	1
Gear on pin right side up in mesh with lever	1
Knockers right side up in mesh with gear	2
Cover screwed on	1
Spring hooked	2
Score (bell)	( )
E:	
Center stud in place	2
Springs in place	1
Caps in place—	
Out of order	1
In order	3
Cover snapped—	
Two sides	1
Three sides	2
Workability	2
Score (coin box)	( )
F:	
Spring correctly placed on one stick	2
Imperfect usable clothespin—	
Unsymmetrical	4
Symmetrical	6
Score (clothespin)	( )
G:	
Small lever in place	2
Lock bolt in place	1
Spring inserted—	
Workably	4
Properly	5
Top fitted on properly and screw inserted	1
Score(lock)	( )
H:	
Both levers backward	1
One forward clear in, other backward	3
Other part way in, forward	4
Both part way in, forward	5
Both clear in, forward, one facing wrong	8
Both facing wrong	9
Score (paper clip)	( )
I:	
Button properly inserted in upper ring	2
Circuit-closing disk properly fitted in bottom ring	2
Rings snapped together	3
Score (electric button)	( )
J:	
U-shaped band held in proper place by pin or wire	1
Trip lever or pin—	
Improperly	1
Properly	2
Wire lever hooked—	
Improperly	1
Properly	2
Springs on pin (count best one)—	
Weak snap, not in slot, either way	1
Weak snap, in slot, either way	2
Strong snap, in slot, wrong way	3
Strong snap, in slot, right way,	
One spring	4
Both springs	5
Score (mouse trap)	( )

ABBREVIATED MECHANICAL TEST.

The abbreviated mechanical test includes only items A, B, D, E, and G of the complete test. Time, *15 minutes.* Score each item according to directions given above and double their sum to secure the total score.

Table of norms.

[Derived from 909 cases; 303d Engineers, Camp Dix.]

Score.	Precentile rank. Per cent.
0	0
10	1.5
20	6
30	12
40	22
50	37
60	53
70	69
80	83
90	94
98	100

Letter rating.	Score.
A	96–100
B	80–95
C	40–79
D	20–39
E	0–19

Appendix A.

Table of equivalent scores.

Alpha.	Beta.	Point scale.	Complete performance.	Short performance.	Stanford-Binet.
					4.0
			3	2	4.5
			4	5	5.0
			6	8	5.5
			9	12	6.0
		31.5	17	17	6.5
		36.0	30	24	7.0
	2	42.0	41	33	7.5
	6	46.0	52	42	8.0
2	11	51.0	62	53	8.5
4	17	55.5	72	67	9.0
7	24	60.0	91	86	9.5
11	30	64.0	114	108	10.0
16	37	68.0	135	127	10.5
21	42	71.0	153	144	11.0
27	47	74.0	166	158	11.5
33	53	77.0	175	169	12.0
40	58	79.0	183	179	12.5
47	63	81.0	189	188	13.0
56	67	83.0	195	197	13.5
63	71	85.0	201	205	14.0
71	75	87.0	208	214	14.5
78	78	88.0	216	223	15.0
85	81	90.0	223	232	15.5
93	84	92.0	230	241	16.0
102	88	95.0	237	250	16.5
114	91	98.0	244	259	17.0
125	95	100.0	251	267	17.5
137	99		258	275	18.0
147	104		268	283	18.5
161	108		290	291	19.0

Basis for the assignment of letter grades.

	Alpha.	Beta.	Point scale.	Complete performance.	Short performance.	Stanford-Binet.
A.....	135–212	100–118	Not given.	260–311	275–308	18.0–19.5
B.....	105–134	90– 99	95–100	240–259	250–274	16.5–17.9
C+.....	75–104	80– 89	90– 94	215–239	220–249	15.0–16.4
C.....	45– 74	65– 79	80– 89	190–214	190–219	13.0–14.9
C.....	25– 44	45– 64	70– 79	150–189	145–189	11.0–12.9
D.....	15– 24	20– 44	60– 69	90–149	85–144	9.5–10.9
D−....	0– 14	0– 19	0– 59	0– 89	0– 84	0.0– 9.4

Appendix B.—Examiner's Outfit.

I. A supplementary outfit is furnished at the commencement of camp examining to provide for the immediate needs of the staff. This outfit includes:

(1) 6 gross lead pencils.
(2) 3 pencil sharpeners.
(3) 2 typewriters.
(4) 2 typewriter tables.
(5) 1 chest of tools.

Additions to and replenishment of these materials must be secured regularly from the medical supply officer by requisition through the division or camp surgeon.

II. Psychological equipment, as such, consists of three groups:

(A) Group examining outfit.
(B) Individual examining outfit.
(C) Printed materials.

The regular procedure for increasing or replacing these supplies is a request through military channels addressed to the Surgeon General of the Army, attention Division of Psychology.

The various items under psychological equipment are listed below.

(A) Group examining:

1. Beta outfit—
   (*a*) Blackboard frame.
   (*b*) Beta chart.
   (*c*) 6 cardboard pieces, test 7.
2. Alpha stencils for each form.
3. Beta stencils.

(B) Individual examining:
1. Point-scale materials.
2. Stanford-Binet materials.
3. Performance-scale materials—
   (*a*) Ship test.
   (*b*) Manikin.
   (*c*) Feature profile.
   (*d*) Cube construction.
   (*e*) Cube imitation.
   (*f*) Form board.
   (*g*) Picture arrangement.
   (*h*) Picture completion.
4. Mechanical skill test.

(C) Printed materials:
1. Group examination alpha, five forms.
2. Group examination beta.
3. Point-scale examination.
4. Stanford-Binet examination.
5. Performance Scale examination.
6. Psychological record.
7. Report of psychological examination.
8. Examiner's guide.

APPENDIX C.—BUILDING AND EQUIPMENT.

Following authorization by the Secretary of War for construction in each camp of special psychology building, it was decided to secure wherever possible the assignment of small barracks building, and to remodel the same for psychological use. Suitable building for psychological examining has been designated in many of the divisional training camps. In others, temporary arrangements have been effected. For the use of the school of military psychology, Medical Officers' Training Camp, Fort Oglethorpe, Ga., a special psychology building has been constructed.

In general, it is desirable that building for psychological examining be located conveniently near receiving and examining station of camp, and if possible also near the personnel office and the office of the camp surgeon and psychiatrist. Where there is a depot brigade the building should be either in or near the same. Since the psychologist will have important functions in connection with the development battalion, it also should be considered in selecting location for psychological work.

For the information of examiners and their guidance in selecting and planning for the remodeling of such building as they may secure for their work, the plans of special psychology building are reproduced herewith.

In planning modifications for any assigned building, it is well to keep in mind the fact that other uses than psychological examining will be found for the psychological building. In the original plan it was intended that the Division of Psychiatry should also have an office in the building and, where necessary, sufficient examining space for individual examinations and consultation. In certain of the camps plans are already on foot to use this building for medical conferences, for conferences between psychiatrists, psychologists, and line officers, for addresses to the line officers on morale, and for discussions and conferences on methods of instruction, and training of the new recruit.

The first floor of the original building was planned to contain alpha and beta examining rooms and a storeroom for heavy materials. The alpha examining room was planned to seat on the floor 160 to 200 men. This room was without benches, but the necessary space for each man is marked out roughly by lines running crosswise of the length of the room. These lines were spaced 3 feet apart. Since the men were to be seated on the floor or on small wicker mats, it was deemed desirable to make the floor of this room of double thickness. A small reading stand with shelves was planned for the large examining room. The small examining room, or beta room, was planned to seat between 60 and 100 men. A bench designed for this room, with its partitions and other measurements, is shown in figure O. It was also deemed desirable to have in this room a raised platform, about 18 inches high, from which the demonstrations could be more easily seen from the back of the room. A bank of lights so arranged as to illuminate the beta blackboard will be found essential on cloudy days. Cross-lights should be avoided. Lights in alpha room should barely clear the tallest men.

The storeroom should have built-in shelves sufficient to enable the examiner to unpack at least one week's supply of the necessary examining materials. Similar shelves should be planned for the scoring room, record room, office, and small storeroom. Shelves in the record room can be made wider than usual shelving, so that if long, narrow boxes are built to contain the record cards they may be placed lengthwise across these shelves. Other necessary changes are indicated on the plan.

A certain amount of furniture, either built by the construction quartermaster or supplied through the camp quartermaster upon requisition, is indicated in the plan. Examiners should have on hand at least 250 strips of beaver board 12 by 18 inches, wicker mats for the alpha examining room, if possible, and a sufficient supply of wall hooks for overcoats and hats of those being examined. Each of the individual rooms on the second floor should be supplied with small tables. In addition, about 20 small tables, 3 by 6 feet, 30 inches high, are needed in the scoring room. According to the desire of the examiner, these tables may be supplied with special scoring tops, as indicated in the specifications and plan in figure 8. For the regular work of the examining staff and scorers at least 75 ordinary chairs should be sufficient.

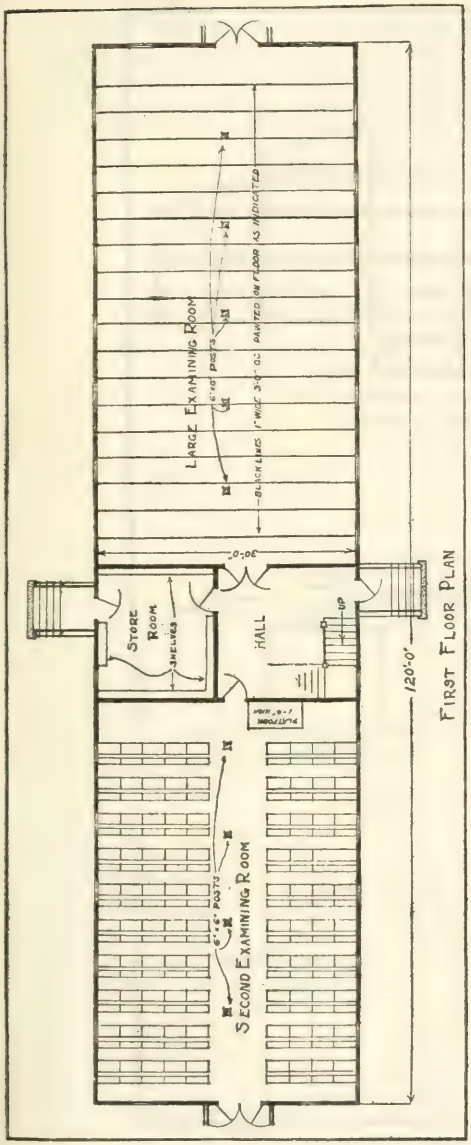


Fig. M.—Plan of Psychology Building.

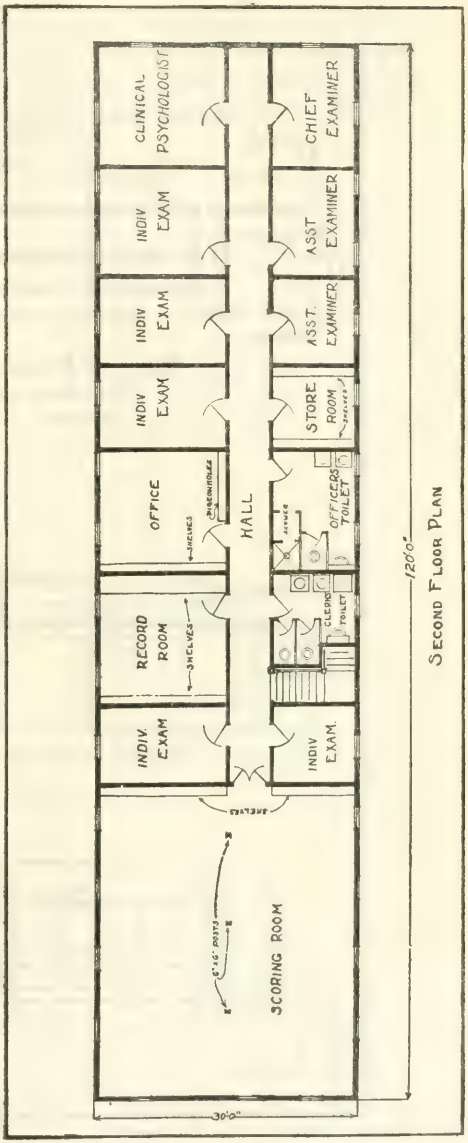


Fig. N.—Plan of Psychology Building.

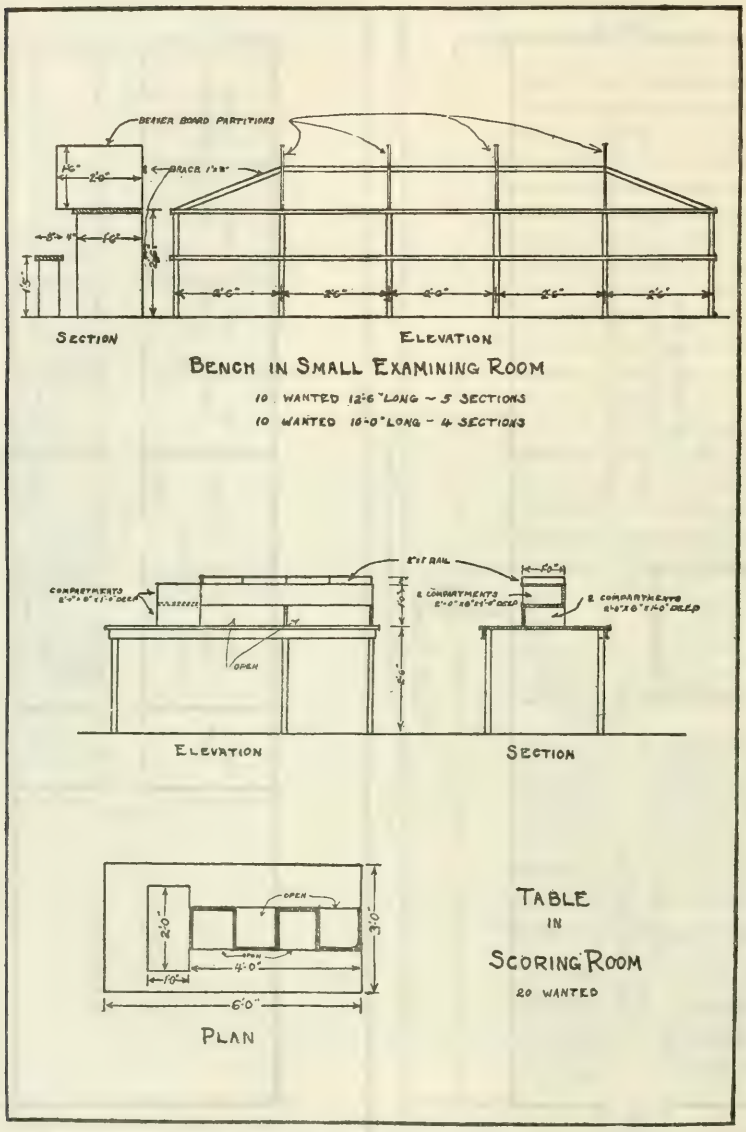
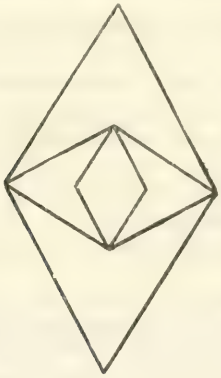
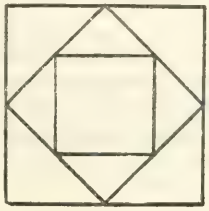


Fig. O.—Furniture for Psychology Building.

This is a brief description of the building and equipment as originally planned for the psychological examining staff. It is obvious that no one of the buildings already constructed can be adapted to meet these suggestions exactly. The original plan and equipment are presented here as suggestions rather than as essential in all details. It is essential that the individual examining be done under as uniform conditions as possible. It is necessary that the chief examiner have a definite address and office within the camp boundaries, and it is further essential that proper storage space be furnished and supplied with locks or guards to protect against loss of examining materials. It is also necessary for accurate scoring and recording that permanent and sufficient floor space be supplied for the scoring unit. Outside these essential and necessary requirements and the expendible equipment necessary to carry on the examining, scoring and recording, physical properties will vary considerably from camp to camp.



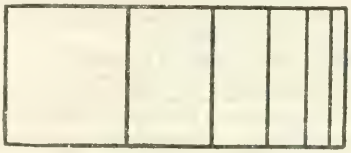
d. 1



d. 2

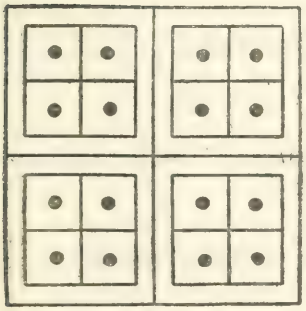
Fig. P.[1]—Exposure designs for Test 6, p. 185.

c. 1



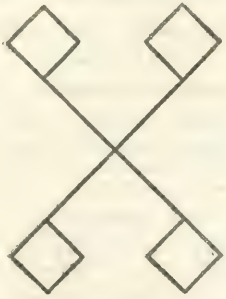
c. 2

Fig. Q.[1]—Exposure designs for Test 6, p. 185.



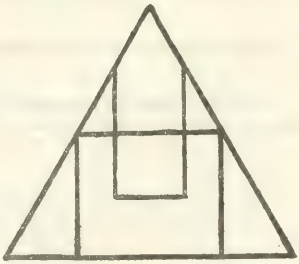
b

Fig. R.[1]—Exposure designs for Test 6, p. 185.



a

Fig. S.[1]—Exposure design for Test 6, p. 185.



x

Fig. T.[1]—Demonstration design for Test 6, p. 185.

[1] Exposure designs of Figs. P to S were presented to subject in the order indicated by the small letters a, b, c, and d. Figure T, designated by letter x, was used only for non-English speaking subjects.

SECTION 5.—*Examiner's guide for students' army training corps.*

[Prepared for the committee on education and special training, War Department.]

(a) INTRODUCTORY STATEMENT.

The instructions presented herewith are for the conduct of examination alpha, the intelligence test prepared especially for literate men in the Army. With minor exceptions, the procedure is the same as that used with other literate recruits.

The purposes of the alpha examination in the Students Army Training Corps are:

(*a*) To secure an objective rating of all students according to general intelligence, as an aid in their final classification for service.

(*b*) To acquaint prospective officers with the nature and value of the psychological ratings which are in general use in the Army.

(*c*) To aid in the educational guidance of students.

(*d*) Where the examination can be given at the opening of a new term, to aid in the selection of candidates for admission.

When the examination can not be given as part of the entrance requirements, it should be given as early as possible after the opening of a new term. The results, if promptly available, will be of value both in the educational guidance of the students and in the evaluation of their work.

In order to eliminate all possibility of coaching, the following precautions should be taken:

(1) Different forms of the alpha examination booklet should be used in successive terms. In general, it will be advisable not to use a given form more than once in a school year of four quarters.

(2) The examinations in a given school should be completed in the shortest possible time. In the smaller schools all the students may ordinarily be examined in the same half day, and in the larger schools in one or, at most, two days.

(3) The greatest care should be taken to prevent the dissemination of examination booklets. Before the men are allowed to leave the room after an examination the number of booklets collected should be carefully checked against the number distributed. Used blanks and blanks held in reserve should be safeguarded by the examiner according to directions furnished by the regional director of psychological tests.

The number of men who should be examined in a group will be determined largely by the available space. Groups of 100 to 200 men are preferable, but under suitable conditions groups of 300 or 400 are readily handled. Crowding, however, should be avoided. When circumstances will permit, the men should be assigned to alternate seats.

It is necessary that some kind of support be provided for the booklets. If there is no suitable room which is fitted with desks, or with chairs having arm rests, then each student may be supplied with a book on which to rest the examination blank during the examination.

While discipline must be preserved throughout the examination, it is necessary that the men be made to feel at ease. Statements which might cause apprehension or nervousness should be avoided. Generally speaking, little should be said by the examiner beyond giving the directions for the separate tests.

The procedure, as set forth in the following pages, should be adhered to rigidly. The directions should be given in the exact words indicated. No supplementary instructions of any kind are permissible. The rule that no questions shall be asked should be strictly enforced. Each test should be timed with a stop watch and care should be exercised to avoid error in timing. A few extra pencils, sharpened, should be at hand to supply men who need a new one during the examination. Pencil, not pen, should be used in all cases.

(b) PROCEDURE.

[Here followed the prologue, which was substantially the same as that given on p. 157.]

Test 1, oral directions.

[Instructions the same as in Examiner's Guide, second revision.]

Test 2, arithmetical problems.

"Attention! Read the directions at the top of the page and do what they tell you to do. I will say "Stop" at the the end of 5 minutes. Do as many as you can in the time allowed.—Ready—GO!"

After 5 minutes, say "STOP! Turn over the page to test 3."

Test 3, practical judgment.

"Attention! Read the directions at the top of the page and do what they tell you to do.—Ready—GO!"

After 1 minute and 40 seconds, say "STOP! Turn over the page to test 4."

Test 4, synonym—antonym.

"Attention! Read the directions at the top of the page and do what they tell you to do.—Ready—GO!"

After 1 minute and 40 seconds, say "STOP! Turn over the page to test 5." (Pause.) "Now you have to turn your books around this way." (Examiner illustrates the necessary rotation.)

Test 5, disarranged sentences.

"Attention! Read the directions at the top of the page and do what they tell you to do.—Ready—GO!"

After 2 minutes and 10 seconds, say "STOP! Turn over the page to test 6."

Test 6, number series completion.

"Attention! Read the samples and the directions at the top of the page and do what the directions tell you to do.—Ready—GO!"

After 3 minutes and 10 seconds, say "STOP! Turn over the page to test 7."

Test 7, analogies.

"Attention! Look at the first sample at the top of the page: Sky—blue : : grass—table, *green*, warm, big.

"Notice the four words in heavy type. One of them—*green*—is underlined. Grass is *green* just as the sky is blue.

"Look at the second sample: Fish—swims : : man—paper, time, *walks*, girl.

"Here the word *walks* is underlined. A man walks and a fish swims.

"Look at the third sample: Day—night : : white—red, *black*, clear, pure.

"Here the word *black* is underlined because black is the opposite of white just as night is the opposite of day.

"In each of the lines below, the first two words are related to each other in some way. What you are to do in each line is to see what the relation is between the first two words and underline the word in heavy type that is related in the same way to the third word. Begin with No. 1 and mark as many sets as you can before time is called.—Ready—GO!"

After 3 minutes, say "STOP! Turn over the page to test 8."

Test 8, information.

"Attention! Read the directions at the top of the page and do what they tell you to do.—Ready—GO!"

After 4 minutes, say "STOP! Close your booklets and turn them over to test 1."

Have all examination booklets and pencils collected immediately and before the men are allowed to leave their seats. Before dismissing the group the number of booklets collected should be carefully checked with the number of men present and the number of booklets issued.

(c) DIRECTIONS FOR SCORING.

The scoring is done by means of stencils, one for each of the eight tests. A test is scored by placing the stencil upon the appropriate page of the record booklet and comparing the responses given with the marks on the stencil.

The stencils may be made of cardboard suitably marked to indicate the correct answer. For tests 4, 5, 7, and 8 stencils made of thin, transparent strips of celluloid are preferable. If celluloid can not be obtained, stencils for these tests may be made of cardboard. In this case the scoring of tests 7 and 8 will be facilitated by perforating the cardboard stencils so as to show where the correct responses are located.

The rules for scoring are as follows:

[Here followed the rules as given on pp. 161–162 of the Examiner's Guide, second revision.]

SECTION 6.—*Examinations a and b.*

On pages 202 to 211, examination *a*, form A, is reproduced complete. The tests were bound in booklet form, 8½ by 11 inches. In actual use, tests 1, 2, 3, 4, and 5 appeared on successive right-hand pages; the backs of these pages were occupied by tests 10, 9, 8, 7, and 6, printed upside down, so that when, at the end of test 5, the booklets were turned around, tests 6, 7, 8, 9, and 10 in turn appeared on the right-hand page. Forms B, C, D, and E of each test appear together, reduced to one-half size, on pages 212 to 218. Certain tests, however, are omitted; the blanks for tests 1 and 2 are the same for all forms and are not repeated. Test 4 is practically identical with test 2, examination alpha (see pages 221 and 228), where forms 5, 6, 7, 8, and 9 correspond to forms A, B, C, D, and E of examination *a*.

In these reproductions, the blanks have been marked, where this is feasible, to indicate the correct response to each item. For responses to test 1, see instructions, Examiner's Guide, first revision, pages 124 to 126.

Examination *b* was the name used when examination *a*, tests 3 to 9, was utilized with increased time limits to give those who had made a low score a more favorable chance to show what they could do. (See Examiner's Guide, first revision, pages 128 to 129.)

FORM A. **GROUP EXAMINATIONS *a* AND *b*** **GROUP NO.**_____

Name _____ Age_____

Company_____ Battalion_____ Regiment_____ Division_____

In what country born?_____ Years in U. S.?_____Race_____

Occupation _____ Weekly Wages _____

Schooling: Grades, 1. 2. 3. 4. 5. 6. 7. 8: High or Prep. School, Year 1. 2. 3. 4: College, Year 1. 2. 3. 4.

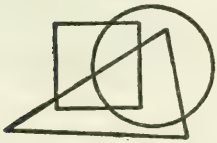
TEST 1

1.

2.

3.

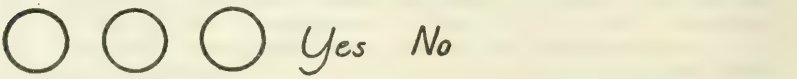
4.

5. 

6. **34-79-56-87-68-25-82-47-27-31-64-93-71-41-52-99**

7.

8.

9. 

10. **A B C D E F G H I J K L M N O P**

Fig. 1.—Group Examinations *a* and *b*, Form A, Test 1, Oral Directions.

TEST 2

This is a test to see how many figures you can remember and write down after they are spoken.

In the first row of empty squares write the first set of figures you hear, as shown in the samples; in the second row write the second set you hear, and so on.

Sample one	- - - - - - -	4 7 5
Sample two	- - - - - - -	8 1 4

Three figures:	First set - - - -	1 3 5
" "	Second set - - - -	6 4 1
Four figures:	First Set - - -	2 8 6 1
" "	Second set - - -	5 3 9 4
Five figures:	First set - - -	7 4 2 9 6
" "	Second set - -	8 5 1 6 4
Six figures:	First set - -	7 2 9 5 3 6
" "	Second set - -	8 4 2 7 5 1
Seven figures:	First set - -	7 4 8 2 5 9 1
" "	Second set - -	8 3 9 6 1 5 2
Eight figures:	First set - -	2 6 9 5 8 3 7 1
" "	Second set -	3 7 2 9 4 1 5 8
Nine figures:	First set -	5 9 4 8 2 7 3 1 6
" "	Second set	4 2 9 3 8 6 1 7 5

Fig. 2.—Group Examinations *a* and *b*. Form A, Test 2, Memory Span.

TEST 3

The words

MORNING THE RISES EVERY SUN

in that order don't make a sentence; but they would make a sentence if put in the right order:

THE SUN RISES EVERY MORNING

and this statement is true.

Again, the words

ANIMAL A IS THE RARE DOG

would make a sentence if put in the order:

THE DOG IS A RARE ANIMAL

but this statement is false.

Below are twenty mixed-up sentences. Some of them are true and some are false. When I say "go," take these sentences one at a time. Decide what each sentence *would* say if the words were straightened out, but don't write them yourself. Then, if what it would say is true, draw a line under the word "true:" if what it would say is false, draw a line under the world "false." If you cannot be sure, guess. The two samples are already marked as they should be. Begin with No. 1 and work right down the page until time is called.

SAMPLES	morning the rises every sun	true	false	
	animal a is the rare dog	true	false	
1	wood guns of made are	true	false	1
2	people are many candy of fond	true	false	2
3	war in are useful airplanes the	true	false	3
4	must die men all	true	false	4
5	property floods life and destroy	true	false	5
6	grow a climate oranges cold in	true	false	6
7	days there in are week eight a	true	false	7
8	months warmest are summer the	true	false	8
9	are and apples long thin	true	false	9
10	clothing valuable are for and wool cotton	true	false	10
11	health necessary camp a is to clean	true	false	11
12	Germany of Wilson king is England and	true	false	12
13	work like men all	true	false	13
14	water cork on float will not	true	false	14
15	iron paper made of is filings	true	false	15
16	tropics is in the produced rubber	true	false	16
17	fish hunt and like boys to never	true	false	17
18	size now of guns use are great in	true	false	18
19	bushes trees roots have and their air the in	true	false	19
20	not bees lazy and are ants called	true	false	20

Fig. 3.—Group Examinations *a* and *b*, Form A, Test 3, Disarranged Sentences.

TEST 4

Get the answers to these examples as quickly as you can.
Use the side of this page to figure on if you need to.

SAMPLES
1 How many are 5 men and 10 men? ---------- Answer (15)
2 If you walk 4 miles an hour for 3 hours, how far do you walk?---------- ---------- Answer (12)

1 How many are 30 men and 7 men? - - - - - - - Answer (37)
2 If you save $7 a month for 4 months, how much will you save? - - - - - - - - - - - - - - Answer (28)
3 If 24 men are divided into squads of 8, how many squads will there be? - - - - - - - - - - - - - - Answer (3)
4 Mike had 12 cigars. He bought 3 more, and then smoked 6. How many cigars did he have left? - - - - - - Answer (9)
5 A company advanced 5 miles from their trenches and retreated 3 miles. How far were they from their trenches then? - Answer (2)
6 How many hours will it take a truck to go 66 miles at the rate of 6 miles an hour? - - - - - - - - - Answer (11)
7 How many cigars can you buy for 50 cents at the rate of 2 for 5 cents? - - - - - - - - - - - - - - Answer (20)
8 A regiment marched 40 miles in five days. The first day they marched 9 miles, the second day 6 miles, the third 10 miles, the fourth 8 miles. How many miles did they march the last day? - - - - - - - - - - - - - - - - Answer (7)
9 If you buy 2 packages of tobacco at 7 cents each and a pipe for 65 cents, how much change should you get from a two-dollar bill? - - - - - - - - - - - - - - Answer ($1.21)
10 If it takes 6 men 3 days to dig a 60-foot trench, how many men are needed to dig it in half a day? - - - - - - Answer (36)
11 A dealer bought some mules for $800. He sold them for $1000, making $40 on each mule. How many mules were there? - - - - - - - - - - - - - - - Answer (5)
12 A rectangular bin holds 400 cubic feet of lime. If the bin is 10 feet long and 5 feet wide, how deep is it? - - - Answer (8)
13 A recruit spent one-eighth of his spare change for post cards and four times as much for a box of letter paper, and then had 90 cents left. How much money did he have at first? - - Answer ($2.40)
14 If 3½ tons of coal cost $21, what will 5½ tons cost? - - Answer ($33)
15 A ship has provisions to last her crew of 500 men 6 months. How long would it last 1200 men? - - - - - - - Answer (2½)
16 If a man runs a hundred yards in 10 seconds, how many feet does he run in a fifth of a second? - - - - - - - Answer (6)
17 A U-boat makes 8 miles an hour under water and 15 miles on the surface. How long will it take to cross a 100-mile channel, if it has to go two-fifths of the way under water? - - Answer (9)
18 If 241 squads of men are to dig 4,097 yards of trench, how many yards must be dug by each squad? - - - - - Answer (17)
19 A certain division contains 3,000 artillery, 15,000 infantry and 1,000 cavalry. If each branch is expanded proportionately until there are in all 20,900 men, how many will be added to the artillery? - - - - - - - - - - - - - Answer (300)
20 A commission house which had already supplied 1,897 barrels of apples to a cantonment delivered the rest of its stock to 29 mess halls. Each mess hall received 54 barrels. What was the total number of barrels supplied? - - - - - - - - Answer (3463)

Fig. 4.—Group Examinations *a* and *b*, Form A, Test 4, Arithmetical Problems.

TEST 5

Notice the sample sentence:

People hear with the eyes ears nose mouth

The correct word is *ears*, because it makes the truest sentence.

In each of the sentences below, you have four choices for the last word. Only one of them is correct. In each sentence draw a line under the one of these four words which makes the truest sentence. If you cannot be sure, guess. The two samples are already marked as they should be.

SAMPLES
- People hear with the eyes ears nose mouth
- France is in Europe Asia Africa Australia

1 The snow comes in winter fall summer spring
2 The lungs are for seeing breathing digestion hearing
3 Milk comes from oxen cows trees vines
4 Squirrels eat mostly grass mice nuts birds
5 The anvil is used in blacksmithing carpentry typewriting bookkeeping
6 The Panama Canal was built by Russia England Mexico United States
7 Eggs come from trees roosters hens dogs
8 A blue-jay is a bird flower stone vegetable
9 The oak is a tree flower bush vine
10 The terrier is a goat cat rabbit dog
11 Seven-up is played with rackets cards pins dice
12 Denver is in Ohio Georgia Colorado Michigan
13 The Leghorn is a kind of horse chicken fish cattle
14 Robert E. Lee was most famous in literature war religion science
15 The slaves were freed by Napoleon I George Washington Abraham Lincoln Metternich
16 The main factory of the Ford automobile is in Bridgeport Cleveland Detroit Youngstown
17 Silk comes from a kind of crab worm beetle plant
18 Rain-water is fresh salt acid sour
19 The Declaration of Independence was signed in Detroit Boston Philadelphia Lexington
20 The artichoke is a fish lizard vegetable snake
21 The airplane was invented in Italy United States Spain Austria
22 The forward pass is used in tennis hand-ball chess foot ball
23 Jess Willard is a fortune-teller labor-leader pugilist singer
24 Revolvers are made by Smith & Wesson Armour & Co. Ingersoll Anhaeuser-Busch
25 The currant grows on a vine sheep tree bush
26 General Lee surrendered at Appomattox in 1812 1886 1865 1832
27 A first class batter now averages around .300 .900 .600 .100
28 The Pittsburgh team is called Giants Cubs Pirates Tigers
29 The Union Commander at Mobile Bay was Dewey Sampson Schley Farragut
30 Among the allies of Germany is Norway Rumania Bulgaria Portugal
31 To set fire to a house is called larceny incest mayhem arson
32 The spark-plug of a gas engine belongs in the crank case manifold cylinder carburetor
33 The Percheron is a horse cow sheep goat
34 The unit of electro-motive force is the volt watt ampere ohm
35 Lincoln was President just after Buchanan Hayes Madison Polk
36 The author of the "Scarlet Letter" is Poe Hawthorne Cooper Holmes
37 Bile is made in the liver kidneys spleen stomach
38 John Sargent is a well known author scientist politician painter
39 Cheviot is a kind of silk cotton wool linen
40 The color of chlorine gas is red blue brown green

Fig. 5.—Group Examinations *a* and *b*, Form A, Test 5, Information.

TEST 6

If the two words of a pair mean the same or nearly the same, draw a line under *same*. If they mean the opposite or nearly the opposite, draw a line under *opposite*. If you cannot be sure, guess. The two samples are already marked as they should be.

SAMPLES	good - bad	same	opposite	
	little - small	same	opposite	
1	empty - full	same	opposite	1
2	fall - rise	same	opposite	2
3	confess - admit	same	opposite	3
4	hill - valley	same	opposite	4
5	allow - permit	same	opposite	5
6	expand - contract	same	opposite	6
7	class - group	same	opposite	7
8	former - latter	same	opposite	8
9	shy - timid	same	opposite	9
10	delicate - tender	same	opposite	10
11	extinguish - quench	same	opposite	11
12	absurd - probable	same	opposite	12
13	violent - mild	same	opposite	13
14	definite - vague	same	opposite	14
15	concave - convex	same	opposite	15
16	champion - advocate	same	opposite	16
17	adapt - conform	same	opposite	17
18	confidence - suspicion	same	opposite	18
19	debase - exalt	same	opposite	19
20	hatred - malevolence	same	opposite	20
21	new - old	same	opposite	21
22	mental - physical	same	opposite	22
23	assert - maintain	same	opposite	23
24	lax - strict	same	opposite	24
25	repress - restrain	same	opposite	25
26	elated - dejected	same	opposite	26
27	amenable - tractable	same	opposite	27
28	avert - prevent	same	opposite	28
29	reverence - veneration	same	opposite	29
30	fallacy - verity	same	opposite	30
31	amateur - professional	same	opposite	31
32	pompous - ostentatious	same	opposite	32
33	amplify - condense	same	opposite	33
34	apathy - indifference	same	opposite	34
35	effeminate - virile	same	opposite	35
36	benign - genial	same	opposite	36
37	acme - climax	same	opposite	37
38	innuendo - insinuation	same	opposite	38
39	aphorism - maxim	same	opposite	39
40	vesper - matin	same	opposite	40

Fig. 6.—Group Examinations *a* and *b*, Form A, Test 6, Synonym—Antonym.

TEST 7

This is a test of common sense. Below are ten questions. Four answers are given to each question. You are to look at the answers carefully; then make a cross in the square before the best answer to each question, as in the sample:

SAMPLE

Why do we use stoves? Because

- [ ] they look well
- [ ] they are black
- [X] they keep us warm
- [ ] they are made of iron

Here the third answer is the best one and is marked with a cross. Begin with No. 1 and keep on until time is called.

---

1 Why ought every man to be educated? Because

- [ ] Roosevelt was educated
- [X] it makes a man more useful
- [ ] it costs money
- [ ] some educated people are wise

2 Why ought a grocer to own an automobile? Because

- [ ] it looks pretty
- [X] it is useful in his business
- [ ] it uses rubber tires
- [ ] it saves railroad fare

3 Why is beef better food than cabbage? Because

- [ ] it is harder to obtain
- [ ] it tastes better
- [X] it is more nourishing
- [ ] it comes from animals

4 Why are doctors useful? Because they

- [X] heal the sick
- [ ] know about herbs
- [ ] understand human nature
- [ ] always have pleasant dispositions

5 Why judge a man by what he does rather than by what he says? Because

- [ ] it is wrong to tell a lie
- [X] what a man does shows what he really is
- [ ] it is wrong to judge anybody
- [ ] a deaf man cannot hear what is said

Go to No. 6 above

6 Why is the telephone more useful than the telegraph? Because

- [X] it gets a quicker answer
- [ ] it uses more miles of wire
- [ ] it is a more recent invention
- [ ] telephone wires can be put under ground

7 Why are war-ships painted gray? Because gray paint

- [ ] is cheaper than any other color
- [ ] is more durable than other colors
- [ ] does not show dirt
- [X] makes the ships harder to see

8 If you find a lost 2-year-old baby on a city street, what should you do?

- [ ] take him to the post office
- [ ] ask him where he lives and take him there
- [X] ask the police to help you or leave him with them
- [ ] if he is a nice child take him to your home and keep him

9 Why is agriculture valuable? Because

- [ ] it supplies luxuries
- [ ] it makes work for the unemployed
- [X] the farmers feed the nation
- [ ] the great men are raised on farms

10 Why is tennis good exercise? Because

- [ ] it is played with rubber balls
- [ ] it demands clear eyes
- [ ] it is very exciting
- [X] it calls for vigorous movement

Fig. 7.—Group Examinations *a* and *b*, Form A, Test 7, Practical Judgment.

TEST 8

In the lines below, each number is gotten in a certain way from the numbers coming before it. Study out what this way is in each line, and then write in the space left for it the number that should come next. The first two lines are already filled in as they should be.

SAMPLES	2,	4,	6,	8,	10,	..*12*..
	11,	12,	14,	15,	17,	..*18*..
	5,	6,	7,	8,	9,	..10..
	9,	11,	13,	15,	17,	..19..
	12,	10,	8,	6,	4,	..2..
	6,	9,	12,	15,	18,	..21..
	2,	3,	5,	8,	12,	..17..
	34,	36,	38,	40,	42,	..44.
	24,	27,	28,	31,	32,	..35.
	28,	31,	33,	36,	38,	..41.
	34,	36,	39,	41,	44,	..46
	46,	44,	41,	39,	36,	..34.
	42,	41,	37,	36,	32,	..31.
	39,	34,	30,	25,	21,	..16..
	52,	44,	36,	28,	20,	..12..
	15,	18,	24,	33,	45,	..60..
	74,	71,	65,	56,	44,	..29..

Fig. 8. Group Examinations *a* and *b*, Form A, Test 8, Number Series Completion.

TEST 9

SAMPLES
- sky—blue : grass—(grow, green, cut, dead)
- fish—swims : man—(boy, woman, walks, girl)
- day—night : white—(red, black, clear, pure)

In each of the lines below, the first two words have a certain relation. Notice that relation and draw a line under the *one* word in the parenthesis which has that particular relation to the third word. Begin with No. 1 and mark as many sets as you can before time is called.

1	cradle—baby : stable—(horse, man, dog, cat)	1
2	man—home : bird—(nest, fly, insect, tree)	2
3	ear—hear : eye—(hair, blue, see, eyebrow)	3
4	go—come : sell—(leave, buy, money, papers)	4
5	dress—woman : feathers—(bird, neck, feet, bill)	5
6	water—drink : bread—(cake, eat, coffee, pie)	6
7	shoe—foot : hat—(coat, nose, head, collar)	7
8	January—February : June—(July, May, month, year)	8
9	hour—minute : minute—(man, week, second, short)	9
10	handle—hammer : knob—(key, door, shut, room)	10
11	abide—depart : stay—(over, home, play, leave)	11
12	hope—despair : happiness—(frolic, fun, joy, sadness)	12
13	success—joy : failure—(sadness, success, fail, work)	13
14	bold—timid : advance—(proceed, retreat, campaign, soldier)	14
15	tiger—carnivorous : horse—(cow, pony, herbivorous, buggy)	15
16	above—below : top—(spin, bottom, surface, side)	16
17	lion—animal : rose—(smell, leaf, plant, thorn)	17
18	food—man : gasoline—(gas, oil, automobile, spark)	18
19	pretty—ugly : attract—(fine, repel, nice, draw)	19
20	peninsula—land : bay—(boats, pay, ocean, Massachusetts)	20
21	eat—fat : starve—(thin, food, bread, thirsty)	21
22	picture—see : sound—(noise, music, bark, hear)	22
23	pupil—teacher : child—(parent, doll, youngster, obey)	23
24	city—mayor : army—(navy, soldier, general, private)	24
25	establish—begin : abolish—(slavery, wrong, abolition, end)	25
26	December—January : last—(least, worst, month, first)	26
27	giant—dwarf : large—(big, monster, queer, small)	27
28	engine—caboose : beginning—(commence, cabin, end, train)	28
29	wool—sheep : fur—(cat, birds, hat, coat)	29
30	quarrel—enemy : agree—(friend, disagree, agreeable, foe)	30
31	razor—sharp : hoe—(bury, dull, cuts, tree)	31
32	winter—summer : cold—(freeze, warm, wet, January)	32
33	sailor—navy : soldier—(gun, cap, hill, army)	33
34	rudder—ship : tail—(bird, sail, dog, cat)	34
35	granary—wheat : library—(desk, books, paper, librarian)	35
36	tolerate—pain : welcome—(pleasure, unwelcome, friends, give)	36
37	sand—glass : clay—(stone, hay, bricks, dirt)	37
38	moon—earth : earth—(ground, Mars, sun, sky)	38
39	tears—sorrow : laughter—(joy, smile, girls, grin)	39
40	cold—ice : heat—(lightning, warm, steam, coat)	40

Fig. 9.—Group Examinations *a* and *b*, Form A, Test 9, Analogies.

TEST 10

Draw a line under the largest number and also under the smallest number in every column on the page.

Samples		Begin Here							
34	31	12	47	75	41	49	57	14	45
79	48	64	56	11	91	54	53	50	77
87	66	17	29	24	16	88	27	93	46
68	26	23	61	55	12	42	15	84	73
25	60	70	69	37	36	29	97	44	38
82	98	33	20	39	75	22	58	90	54
27	33	93	71	38	18	79	19	32	70
30	23	45	68	49	60	43	85	74	89
19	52	87	48	88	92	35	81	17	42
24	78	28	26	15	96	47	57	91	31

816	181	197	102	279	908
629	206	653	135	183	955
118	995	604	454	162	646
192	444	159	550	798	112
691	785	846	734	193	827
232	813	196	749	290	807
861	895	678	235	833	770
885	605	958	563	933	492
137	585	672	875	431	418
815	178	877	890	552	806

3049	1185	3491	4982	2968	2170
7367	4833	5421	4538	1456	7997
4751	2778	6522	7461	1275	7329
6319	3132	3887	6679	6920	7752
1855	2428	9786	8083	2513	2220
8180	9096	6426	2369	8959	8631
1216	3692	7170	4643	5776	6126
9330	9953	9572	3288	4477	9675
3594	1217	8441	9815	8792	3455
4412	8413	6937	5043	7522	7180

Fig. 10.—Group Examinations *a* and *b*, Form A, Test 10, Number Comparison.

EXAMINATION. a

Test 3. Disarranged Sentences.

Form B

1 noise guns loud make a ..... true..false 1
2 tall all six men feet are ..... true..false 2
3 float iron water on will ..... true..false 3
4 music fond people most are of ..... true..false 4
5 grow and apples ground oranges the in ..... true..false 5
6 made cloth wool cotton and is from ..... true..false 6
7 Australia most in live Arabs ..... true..false 7
8 in die is battle honorable to ..... true..false 8
9 warm winter in we clothes wear ..... true..false 9
10 fish many to good eat are ..... true..false 10
11 trees the fish in swim ..... true..false 11
12 known elephant animal an is smallest the ..... true..false 12
13 trees horses sea and in grow the ..... true..false 13
14 sand of made bread powder and is ..... true..false 14
15 every times make mistakes person at ..... true..false 15
16 a ocean cross minutes few can boat the in a ..... true..false 16
17 horses automobile an are than slower ..... true..false 17
18 two one than hands are better ..... true..false 18
19 president Columbus first the was America of ..... true..false 19
20 ninety canal ago built Panama years was the ..... true..false 20

Form C

1 gun shoot to is a ..... true..false 1
2 see are with to eyes ..... true..false 2
3 harnesses paper of made are ..... true..false 3
4 Utah in cotton grows ..... true..false 4
5 a battle in racket very tennis useful is ..... true..false 5
6 months there twelve year are a in ..... true..false 6
7 winter come snowstorms in ..... true..false 7
8 thunders rains when it always it ..... true..false 8
9 many thumbs fingers as men as have ..... true..false 9
10 Florida caught salmon in are most ..... true..false 10
11 shoes wear to are feet the on ..... true..false 11
12 dogs some and bark bite ..... true..false 12
13 flag the English same the as is the American ..... true..false 13
14 battleships on seldom sails used are ..... true..false 14
15 time in soldiers war trees in sleep ..... true..false 15
16 leg flies one have only ..... true..false 16
17 vote children twenty-one cannot under ..... true..false 17
18 education of a part play valuable is ..... true..false 18
19 hatred bad unfriendliness traits are and ..... true..false 19
20 gases the in Mohawks fighting used poisonous ..... true..false 20

Form D

1 west the in rises the sun ..... true..false 1
2 happiness buy can money ..... true..false 2
3 young nurse their cats ..... true..false 3
4 noise cannon never make a ..... true..false 4
5 happy is man sick always a ..... true..false 5
6 months coldest are summer the ..... true..false 6
7 made chairs wood are of ..... true..false 7
8 oil water not and will mix ..... true..false 8
9 water in fish the live ..... true..false 9
10 wood eat and good to are coal ..... true..false 10
11 and cows from honey come bread ..... true..false 11
12 honey bees flowers gather the from ..... true..false 12
13 feel wood are coal and for burned ..... true..false 13
14 gotten sea-water sugar is from ..... true..false 14
15 hump camel has a his a back on ..... true..false 15
16 food is tobacco as valuable a not ..... true..false 16
17 moon earth the only from feet twenty the is ..... true..false 17
18 a general not major a and rank same the of are ..... true..false 18
19 Washington canal 1776 Panama the in built ..... true..false 19
20 begin a and apple acorn ant words with the ..... true..false 20

Form E

1 men makes marching tired ..... true..false 1
2 east the in rises sun the ..... true..false 2
3 chairs sit are to on ..... true..false 3
4 wood made carpets are of ..... true..false 4
5 not eat gunpowder to good is ..... true..false 5
6 are clothes all made cotton of ..... true..false 6
7 trees in nests build birds ..... true..false 7
8 good are shots soldiers all ..... true..false 8
9 north all railroads south and run ..... true..false 9
10 money marry always for men ..... true..false 10
11 eggs birds hens and lay ..... true..false 11
12 high hard to are mountains climb ..... true..false 12
13 policy not is the honesty best ..... true..false 13
14 pole north equator mile one from is the the ..... true..false 14
15 explosive a dynamite high is ..... true..false 15
16 place pole is north fine a the ..... true..false 16
17 fever from free army usually camps typhoid are ..... true..false 17
18 and eat good gold silver to are ..... true..false 18
19 Bible earth the says inherit the the shall meek ..... true..false 19
20 to aid deep great snow a military manoeuvers is ..... true..false 20

Fig. 11.—Group Examinations *a* and *b*, Four Forms, Test 3, Disarranged Sentences.

EXAMINATION a

Test 5 Information.

Form B

Acorns grow on beeches poplars balsams oaks
The meat of the sheep is called pork veal mutton beef
The mosquito is a bird insect plant lizard
Cornmeal is red green yellow blue
A sweet smelling flower is the sparrow mink adder rose
The rattler is a kind of fish bird insect snake
Sea-water contains a large amount of sugar quinine salt acid
Wine is generally made from apples peaches oranges grapes
Ivory is obtained from mines elephants reefs oysters
The kidneys are in the head chest neck abdomen
San Francisco is in Oregon Colorado California Nevada
The product advertised as 99 $\frac{44}{100}$ % pure is Gold Dust Ivory Soap Pebeco Violet Talc.
Tennis is played with dice pins rackets cards
Edison is famous as a mathematician musician essayist inventor
Goal posts are used in hand ball foot ball base-ball tennis
Geraldine Farrar is best known as a pianist suffragette army nurse singer
Gingham is a kind of silk wool cotton linen
New Orleans is in Indiana Louisiana Alabama Mississippi
The author of "Robinson Crusoe" is Kipling Scott Defoe Stevenson
The U. S. Naval Academy is at Portland West Point Annapolis South Bend
The boa-constrictor is a kind of lizard vegetable snake fish
The St. Louis Americans are called the Reds Browns Tigers Giants
Velvet Joe appears in advertisements of dry goods tobacco tooth powder shaving soap
Dioxogen is the name of a fountain drink chewing gum lubricant disinfectant
The President during the war of 1812 was Hayes Garfield Madison Polk
The Bartlett is a kind of fish fruit fowl cattle
Coral is obtained from mines elephants oysters reefs
The number of a Korean's legs is two four six eight
Air and gasoline are mixed in the manifold carburetor crank-case differential
The larynx is in the abdomen chest neck head
Oxo is the name of a meat-extract automobile cigar tooth powder
Stanley Ketchel was a labor leader actor pugilist general
The Zeppelin is a monoplane biplane dirigible submarine
The mimeograph is a typewriter addressing machine copying machine time recorder
The U. S. S. Michigan is a battleship cruiser submarine destroyer
The Norman conquest of England was in 966 1066 1166 1266
Madras is a kind of wool linen silk cotton
Cerise is a [illegible] drink color food
The Indian Manufacturing Co. make office equipment athletic goods paper motorcycles
The "aerial" is an instrument used in aviation astronomy botany wireless telegraphy

Form C

1 The color of fresh snow is white blue brown green
2 The ears are used in breathing digestion hearing seeing
3 Cows eat mostly meat grass nuts fruit
4 Dogs like best to eat grass seeds fruits meat
5 Thorns grow on daisies buttercups sun-flowers roses
6 Bull Durham is the name of chewing-gum aluminum-ware tobacco clothing
7 America was discovered by Drake Hudson Columbus Cabot
8 The apple grows on a vine bush tree reed
9 Berlin is the capital of Russia Germany England France
10 Blood is pumped by the lungs liver heart kidneys
11 Molasses is obtained from honey petroleum turpentine sugar-cane
12 Bowling is played with rackets cards balls dice
13 Baltimore is in Maryland Virginia Pennsylvania Ohio
14 St. Paul is in Missouri Minnesota Mississippi Florida
15 Ordinary flour is made from barley rye oats wheat
16 The lemon is most like the apple pear peach orange
17 The sacrifice hit comes in foot ball tennis base ball hand-ball
18 Gas engines are lubricated by gasoline air water oil
19 Buenos Ayres is a city of Spain Argentina Brazil Portugal
20 Moccasins are worn on the head feet hands shoulders
21 The Mackintosh Red is a kind of fish cattle fowl fruit
22 The author of "Treasure Island" is Kipling Scott Defoe Stevenson
23 Food products are made by Cluett Peabody Kuppenheimer Armour & Co. Smith & Wesson
24 The Oliver is a copying machine calculating machine typewriter adding machine
25 The Detroits are called the Indians Tigers Athletics Browns
26 The howitzer is a type of machine-gun rifle cannon pistol
27 A passenger locomotive type is the Mikado Consolidation Mogul Atlantic
28 John Wesley was most famous in science religion war literature
29 Stone & Webster are well known ship-builders engineers jewelers cigar-makers
30 Coal and oil are great industries of Georgia Oregon Pennsylvania Maine
31 The Brooklyn Nationals are called Giants Orioles Superbas Indians
32 The number of a Hottentot's legs is two four six eight
33 Pongee is a dance food fabric drink
34 Napoleon defeated the Austrians at Leipsic Friedland Wagram Waterloo
35 "Country Gentleman" is a kind of oats wheat corn hay
36 The President during the Spanish War was Hayes Madison McKinley Polk
37 The Cooper Hewitt lamp uses the vapor of gasoline tungsten mercury alcohol
38 The Airshire is a kind of fowl fruit cattle fish
39 "The Last of the Mohicans" is by Holmes Lowell Poe Cooper
40 An irregular four-sided figure is called scolium trapezium parallelogram pentagon

Form D

Ripe strawberries are black blue green red
The stomach is used in seeing hearing digestion breathing
Melting snow turns into milk wine water alcohol
Rain water comes from the sun moon clouds stars
Horseshoes are made of glass lead iron wood
Spiders spin nets for birds fish flies snakes
Butter comes from petroleum cows oxen fruits
The human voice is imitated by horses squirrels parrots bees
Boston is in Rhode Island Massachusetts Maine Connecticut
London is the capital of Russia Spain Italy England
Dublin is in Wales Ireland New Zealand Scotland
The pitcher has an important place in tennis foot-ball base-ball hand ball
Alfalfa is a kind of hay corn wheat oats
The woodbine is a tree rock bush vine
Automobile motors are usually driven by oil gasoline water air
Military bullets have jackets made of lead tin copper steel
A famous movie actor is Arthur Brisbane Charlie Chaplin Richard Mansfield George Ade
Beets are used in making leather ivory hominy sugar
The Holstein is a kind of fowl fruit fish cattle
The number of a beetle's legs is four six eight ten
The number of a camel's legs is two four six eight
The chief automobile center of the country is Detroit Buffalo St. Louis Pittsburg
The [illegible] is a kind of fowl cattle fruit fish
The Westinghouse Co. make paper motorcycles electrical goods office equipment
The author of "The Raven" is Poe Lowell Cooper Holmes
The color of sulphur is red blue yellow green
The author of "Barrack Room Ballads" is Stevenson Defoe Kipling Scott
The Ben Davis is a variety of apple corn tomato peach
The headquarters of the "Kodak" are in Boston Rochester Syracuse Philadelphia
The Battle of Gettysburg was fought in 1863 1813 1778 [illegible]
Maurice McLoughlin is best known for his golf tennis baseball football
The Clevelands are called the Orioles Indians Giants Superbas
The sextant is used in shorthand telegraphy navigation chemistry
A great chemical firm is Eimer & Amend Ward & Gow Graton & Knight Pullman Co.
The number of a spider's legs is four six eight ten
Henry VIII's wives numbered 4 5 6 7 8 9
The Gnome engine is chiefly used in airplanes automobiles tractors motorcycles
Isaac Pitman was a pioneer in physics shorthand railroading electricity
Lord Kelvin was most famous in politics science literature war
The "Camembert" is a kind of fowl fruit cheese fish

Form E

1 The number of a dog's legs is four six eight ten
2 Bees gather milk honey flour leaves
3 Mice are fond of rabbits cats cheese owls
4 Sheep eat mostly nuts fruits stones grass
5 Chicago is in Minnesota Wisconsin Nebraska Illinois
6 Horns grow on mules squirrels cows pigs
7 Cider comes from peaches grapes apples lemons
8 A good tree climber is the dog rabbit cat horse
9 The meat of the steer is called beef mutton veal pork
10 The clarinet is used in book-binding riding music carpentry
11 The liver is in the chest head neck abdomen
12 Soap is made by Smith & Wesson Procter & Gamble Anhaeuser Busch Cluett-Peabody
13 Edison is most famous in religion invention war literature
14 Fatima is a make of automobile cigarette lamp fountain pen
15 The U. S. school for army officers is at Annapolis West Point Terre Haute Ithaca
16 The copperhead is a kind of tree flower snake fish
17 Vienna is in Austria Spain Italy Rumania
18 A small heavy rubber ball is used in base ball hand ball foot ball tennis
19 Among the evergreen trees is the birch spruce hickory walnut
20 The number of cylinders in the standard Cadillac is four six eight twelve
21 Venizelos is most famous in science literature music politics
22 The Jersey is a kind of cattle fish fowl fruit
23 "The Autocrat of the Breakfast Table" is by Lowell Poe Holmes Cooper
24 The capital of Ireland is Belfast Cork Dublin Listowell.
25 Edith Cavell was best known as a suffragette army nurse singer pianist
26 Bombay is a city in China France Japan India
27 The headquarters of the B. F. Goodrich Co. are in Youngstown Akron Troy Louisville
28 Diamonds are obtained from reefs oysters mines elephants
29 The Multigraph is a time recorder copying machine calculator addressing machine
30 An air-cooled engine is used in the Packard Buick Franklin Ford
31 "World's Work" is published by Doubleday, Page McClures Munseys Harpers
32 The Durham Shorthorn is a kind of sheep goat elephant cattle
33 Insurance is the chief business of Pittsburgh Hartford Detroit New Haven
34 Faraday was most famous in literature war science religion
35 Joseph Choate was a lawyer engineer merchant scientist
36 Libby, McNeill & Libby deal in beef cut glass jewelry toilet preparations
37 The number of a Guernsey's legs is two four six eight
38 The President during the Mexican War was McKinley Polk Madison Hayes
39 Blackstone was most famous in literature science law religion
40 Feldspar is a liquid gas mineral vegetable

Fig. 12.—Examinations *a* and *b*, Four Forms, Test 5, Information.

EXAMINATION a

Test 6 Synonym - Antonym

Form B

1	long - short	same	opposite	1
2	cold - hot	same	opposite	2
3	bare - naked	same	opposite	3
4	minus - plus	same	opposite	4
5	find - lose	same	opposite	5
6	chrill - sharp	same	opposite	6
7	grim - stern	same	opposite	7
8	joy - sorrow	same	opposite	8
9	crude - coarse	same	opposite	9
10	cheerful - sad	same	opposite	10
11	palace - hut	same	opposite	11
12	knave - villain	same	opposite	12
13	odd - even	same	opposite	13
14	careless - anxious	same	opposite	14
15	null - void	same	opposite	15
16	commend - approve	same	opposite	16
17	furtive - sly	same	opposite	17
18	any - none	same	opposite	18
19	linger - loiter	same	opposite	19
20	competent - qualified	same	opposite	20
21	brief - concise	same	opposite	21
22	agony - bliss	same	opposite	22
23	abide - depart	same	opposite	23
24	wax - wane	same	opposite	24
25	recant - disavow	same	opposite	25
26	deplete - exhaust	same	opposite	26
27	adversary - colleague	same	opposite	27
28	decadence - decline	same	opposite	28
29	defective - normal	same	opposite	29
30	saunder - apart	same	opposite	30
31	celibate - married	same	opposite	31
32	aggrandize - belittle	same	opposite	32
33	nullify - annul	same	opposite	33
34	avarice - cupidity	same	opposite	34
35	altruistic - egoistic	same	opposite	35
36	recoup - recover	same	opposite	36
37	superfluous - essential	same	opposite	37
38	ambiguous - equivocal	same	opposite	38
39	agglomerate - scatter	same	opposite	39
40	plenary - complete	same	opposite	40

Form C

1	cry · laugh	same	opposite	1
2	flat · level	same	opposite	2
3	heaven · hell	same	opposite	3
4	slim · slender	same	opposite	4
5	beg · entreat	same	opposite	5
6	asleep · awake	same	opposite	6
7	comfort · console	same	opposite	7
8	pigmy · giant	same	opposite	8
9	accept · reject	same	opposite	9
10	saint · sinner	same	opposite	10
11	genius · idiot	same	opposite	11
12	appeal · beseech	same	opposite	12
13	adore · worship	same	opposite	13
14	cautious · heedless	same	opposite	14
15	legal · lawful	same	opposite	15
16	contradict · confirm	same	opposite	16
17	legible · readable	same	opposite	17
18	amiable · surly	same	opposite	18
19	cleave · split	same	opposite	19
20	concede · deny	same	opposite	20
21	convoke · dismiss	same	opposite	21
22	dearth · scarcity	same	opposite	22
23	besmirch · cleanse	same	opposite	23
24	hoax · deception	same	opposite	24
25	exceed · surpass	same	opposite	25
26	congregate · assemble	same	opposite	26
27	irksome · refreshing	same	opposite	27
28	docile · refractory	same	opposite	28
29	lucrative · profitable	same	opposite	29
30	momentous · immaterial	same	opposite	30
31	colleague · antagonist	same	opposite	31
32	contingent · dependent	same	opposite	32
33	acquit · arraign	same	opposite	33
34	affix · append	same	opposite	34
35	essential · fundamental	same	opposite	35
36	ligature · band	same	opposite	36
37	myopia · hyperopia	same	opposite	37
38	motile · sessile	same	opposite	38
39	amenable · tractable	same	opposite	39
40	obdurate · stubborn	same	opposite	40

Form D

1	no · yes	same	opposite	1
2	near · close	same	opposite	2
3	bitter · sweet	same	opposite	3
4	go · leave	same	opposite	4
5	command · obey	same	opposite	5
6	tease · plague	same	opposite	6
7	start · finish	same	opposite	7
8	enormous · gigantic	same	opposite	8
9	toward · from	same	opposite	9
10	often · seldom	same	opposite	10
11	sacred · hallowed	same	opposite	11
12	assume · suppose	same	opposite	12
13	complex · simple	same	opposite	13
14	masculine · feminine	same	opposite	14
15	confer · grant	same	opposite	15
16	connection · separation	same	opposite	16
17	diligent · industrious	same	opposite	17
18	advertise · announce	same	opposite	18
19	corrupt · honest	same	opposite	19
20	apprehensive · fearful	same	opposite	20
21	acquire · lose	same	opposite	21
22	plural · singular	same	opposite	22
23	liberal · bigoted	same	opposite	23
24	ancient · modern	same	opposite	24
25	defile · purify	same	opposite	25
26	somber · gloomy	same	opposite	26
27	respectful · impertinent	same	opposite	27
28	compute · calculate	same	opposite	28
29	vestige · trace	same	opposite	29
30	chasm · abyss	same	opposite	30
31	vilify · praise	same	opposite	31
32	sterile · fertile	same	opposite	32
33	finite · limited	same	opposite	33
34	confirm · corroborate	same	opposite	34
35	immune · susceptible	same	opposite	35
36	abstruse · recondite	same	opposite	36
37	transient · permanent	same	opposite	37
38	palliate · mitigate	same	opposite	38
39	extinct · extant	same	opposite	39
40	pertinent · relevant	same	opposite	40

Form E

1	alive · dead	same	opposite	1
2	tie · fasten	same	opposite	2
3	whole · part	same	opposite	3
4	danger · safety	same	opposite	4
5	genuine · real	same	opposite	5
6	choose · select	same	opposite	6
7	fault · virtue	same	opposite	7
8	similar · different	same	opposite	8
9	jealousy · envy	same	opposite	9
10	excess · surplus	same	opposite	10
11	sacred · profane	same	opposite	11
12	conquer · subdue	same	opposite	12
13	treason · loyalty	same	opposite	13
14	vanity · conceit	same	opposite	14
15	allure · attract	same	opposite	15
16	waste · conserve	same	opposite	16
17	deride · ridicule	same	opposite	17
18	censure · praise	same	opposite	18
19	slovenly · neat	same	opposite	19
20	illustrious · brilliant	same	opposite	20
21	agitate · excite	same	opposite	21
22	haggard · gaunt	same	opposite	22
23	con · pro	same	opposite	23
24	subject · object	same	opposite	24
25	orifice · aperture	same	opposite	25
26	conspicuous · prominent	same	opposite	26
27	depressed · elated	same	opposite	27
28	eminent · distinguished	same	opposite	28
29	frivolous · serious	same	opposite	29
30	erudite · scholarly	same	opposite	30
31	recline · stand	same	opposite	31
32	degenerate · deteriorate	same	opposite	32
33	martial · civil	same	opposite	33
34	nonchalance · anxiety	same	opposite	34
35	torpor · stupor	same	opposite	35
36	comprehensive · restricted	same	opposite	36
37	latent · hidden	same	opposite	37
38	node · knot	same	opposite	38
39	celestial · terrestrial	same	opposite	39
40	carnivorous · herbivorous	same	opposite	40

Fig. 13.—Group Examinations *a* and *b*, Four Forms, Test 6, Synonym—Antonym.

EXAMINATION a

Test 7 Practical Judgment

Form B

If you are in danger of sunstroke what should you do?
- [ ] drink whiskey
- [ ] take off your shoes
- [X] get in the shade or wet your head
- [ ] run to the hospital

Why should food be chewed before swallowing? Because
- [X] it is better for the health
- [ ] it is bad manners to swallow without chewing
- [ ] you may choke if you don't chew
- [ ] liquids are not so nourishing

Why is winter colder than summer? Because
- [ ] the days are longer in winter
- [X] the sun shines slanting upon us
- [ ] the city is a coldmeath
- [ ] there is much snow in winter

If you are lost in a forest in the daytime, what is the thing to do?
- [ ] go straight ahead to a big tree
- [ ] hurry to the nearest house you know of
- [ ] look for something to eat
- [X] use the sun or a compass for a guide

Gold is more suitable than iron for making money. Because
- [ ] gold is pretty
- [ ] gold costs costly
- [X] gold is much scarcer and therefore more valuable
- [ ] gold has greater strength

Go to No. 6 above

6 Why is wheat better for food than corn? Because
- [ ] it is more expensive
- [X] it is more nutritious
- [ ] it is a smaller grain
- [ ] it can be ground fine

7 Why are electric lights better than gas lights? Because electricity
- [X] is safer and more convenient
- [ ] is cheaper
- [ ] makes a bright or light
- [ ] is the same as lightning

8 Why is New York larger than Boston? Because
- [ ] it is on an island
- [ ] it has more millionaires
- [ ] it was founded by the Dutch
- [X] it is better located

9 Why are electrical engineers highly paid? Because
- [ ] they are the most intelligent men
- [X] they do things which create wealth
- [ ] they have a union
- [ ] they work long hours

10 Why does it pay to get a good education? Because
- [X] it makes a man more useful and happy
- [ ] it makes work for teachers
- [ ] it makes demand for buildings for schools and colleges
- [ ] it stimulates the printing business

Form C

1 Cats are useful animals, because
- [X] they catch mice
- [ ] they have soft coats
- [ ] they are gentle
- [ ] they are afraid of dogs

2 If while on the march you get bitten by a rattlesnake, you should
- [ ] kill the snake
- [X] suck the poison from the wound
- [ ] go in swimming
- [ ] run back to camp and get some whiskey

3 Woolen is better than cotton for winter clothing, because
- [ ] it is thicker
- [ ] it grows on sheep
- [X] it is warmer
- [ ] it is more expensive

4 If a man knew he would die in two weeks, he should
- [ ] blow in all his money
- [X] make his will and straighten out his accounts
- [ ] go dig his grave
- [ ] start out on a sight-seeing trip

5 It is wiser to put some money aside and not spend it all, so that you may
- [ ] collect all the different kinds of money
- [ ] gamble when you wish
- [ ] have more than your neighbor
- [X] prepare for old age or sickness

Go to No. 6 above

6 A machine gun is better than a rifle, because it
- [X] fires more rapidly
- [ ] is heavier
- [ ] was invented more recently
- [ ] can be used with less training

7 If a drunken man is quarrelsome and wants to fight you, you should
- [ ] knock him down
- [ ] have him arrested and sent to prison for a year
- [ ] take him home and put him to bed
- [X] leave him alone

8 A country should have many railroads, because
- [ ] they keep wages of many men high
- [ ] they decrease the prices of food materials
- [X] they make it easy to travel and carry goods
- [ ] they are good for the steel business.

9 Everyone should be vaccinated against typhoid fever, because
- [ ] many men have typhoid
- [X] we can thus prevent the disease
- [ ] typhoid affects the digestion
- [ ] typhoid produces a high temperature

10 If the wind blows your hat off while riding
- [ ] turn the auto around and go back for it
- [ ] wait till someone comes along to get it for you
- [ ] drive to the next town and buy another
- [X] run back for it before the wind blows it far

Form D

If it rains when you are starting to go for the doctor, what should you do?
- [ ] stay at home
- [X] take an umbrella
- [ ] wait until it stops raining
- [ ] build a fire to dry your clothes

If a gun carriage gets stuck in the mud, what should you do?
- [ ] sit down and wait for the road to dry
- [ ] leave it and go on
- [X] get more horses or autos and pull it out
- [ ] blast it out with dynamite

Why is a check better than real money? Because
- [ ] checks are safer and more convenient
- [ ] checks are cleaner than bills
- [ ] checks are lighter than coins
- [ ] you can have all the money you need by writing checks

If you were asked what you thought of a person that you did not know, what should you say?
- [ ] I will go and get acquainted
- [ ] I think he is all right
- [ ] I know somebody who knows him
- [ ] I do not know him and cannot say

If your clothes are stolen while you are bathing in the river, what should you do?
- [ ] get some money to buy a suit
- [ ] make a fire and wait till somebody comes
- [ ] wait till night and go to a farm house to get clothing
- [ ] get some fish to eat while you have to stay there

Go to No. 6 above

6 If the grocer should give you too much money in making change, what is the thing to do?
- [ ] take the money and hurry out
- [X] tell him of his mistake
- [ ] buy some candy with it
- [ ] give it to the next poor man you meet

7 If you are on sentry duty and see an enemy force approaching in the distance, what should you do?
- [ ] hide and wait for them
- [X] hurry back and report
- [ ] yell the countersign
- [ ] surrender to them

8 Why do some people think that short men should be admitted into the army? Because
- [X] usefulness does not depend on height
- [ ] they want to enlist
- [ ] they are more intelligent than tall men
- [ ] they have better eyesight

9 If you do not get a letter from home which you know was written, what is the reason? Because
- [ ] it was written in pencil
- [X] it was lost or the address was incomplete
- [ ] you forgot to tell your people to write
- [ ] the postal service is discontinued

10 Why should you not give money to beggars on the street? Because
- [ ] it breaks up families
- [ ] it makes it hard for the beggar to get work
- [ ] it takes away the work of organized charities
- [X] it encourages living off of others

Form E

1 If a man gets tired of his work, he should
- [ ] throw it up
- [X] keep at it till the work is done
- [ ] run away and loaf
- [ ] make someone else do it

2 If you find a man who has hanged himself, what is the thing to do?
- [ ] run away
- [ ] send a notice to the paper
- [ ] take him home
- [X] call a doctor or the police

3 If a person asks you for information which you do not have, you should
- [ ] tell him something
- [ ] walk away
- [ ] pretend you do not understand his language
- [X] say you do not know

4 If a man who can't swim should fall into a river, he should
- [X] yell for help and try to scramble out
- [ ] collect wood and make a raft
- [ ] dive to the bottom and crawl out
- [ ] lie on his back and float

5 If your gun explodes during a battle, what should you do?
- [X] throw it away and get another
- [ ] keep it to use as a club
- [ ] take it apart and save the undamaged parts
- [ ] try to fix it

Go to No 6 above

6 If someone does you a favor, what should you do?
- [ ] try to forget it
- [ ] steal for him if he asks you to
- [X] return the favor as soon as you can
- [ ] marry his sister if she wants you to

7 If you are hurrying in an auto to catch a train and come to a swollen stream, what should you do?
- [ ] wait till the water goes down
- [X] go around and try another road
- [ ] take off your clothes and swim across
- [ ] hire a horse and ride across

8 Why are high mountains covered with snow? Because
- [ ] they are near the clouds
- [ ] the sun seldom shines on them
- [ ] they shed the rain
- [X] the air at great heights is always cold

9 Why is leather used for shoes? Because
- [ ] it is cheap and produced in all countries
- [ ] it wears out easily
- [X] it wears well and is easy to shape to the foot
- [ ] it is made of felt

10 If you are held up and robbed in a strange city, you should
- [ ] ask the next man you meet for money to get home
- [X] telegraph home for money or get a job
- [ ] borrow some money at a bank
- [ ] sell your clothes

Fig. 11. Group Examinations *a* and *b*, Four Forms, Test 7, Practical Judgment.

EXAMINATION a

Test 8 Number Series Completion.

Form B

4,	5,	6,	7,	8,	9
1,	4,	7,	10,	13,	16
9,	11,	13,	15,	17,	19
7,	6,	5,	4,	3,	2
3,	4,	6,	9,	13,	18
19,	16,	14,	11,	9,	6
22,	17,	16,	11,	10,	5
36,	40,	41,	45,	46,	50
27,	32,	37,	42,	47,	52
26,	33,	37,	42,	46,	51
56,	57,	59,	62,	66,	71
58,	57,	55,	52,	48,	43
31,	36,	38,	43,	45,	50
60,	57,	52,	49,	44,	41
64,	55,	46,	37,	28,	19

Form C

1,	2,	3,	4,	5,	6
4,	6,	8,	10,	12,	14
6,	5,	4,	3,	2,	1
9,	12,	15,	18,	21,	24
4,	5,	7,	10,	14,	19
15,	13,	11,	9,	7,	5
29,	34,	35,	40,	41,	46
37,	42,	44,	49,	51,	56
50,	47,	46,	43,	42,	39
33,	37,	42,	46,	51,	55
50,	46,	41,	37,	32,	28
58,	53,	51,	46,	44,	39
41,	49,	57,	65,	73,	81
27,	31,	39,	51,	67,	87
84,	79,	69,	54,	34,	9

Form D

6,	7,	8,	9,	10,	11
5,	7,	9,	11,	13,	15
3,	6,	9,	12,	15,	18
13,	12,	11,	10,	9,	8
16,	14,	12,	10,	8,	6
1,	2,	4,	7,	11,	16
44,	45,	47,	48,	50,	51
40,	39,	37,	36,	34,	33
40,	47,	54,	61,	68,	75
35,	38,	42,	45,	49,	52
64,	60,	58,	54,	52,	48
29,	33,	36,	40,	43,	47
37,	35,	31,	29,	25,	23
47,	44,	38,	29,	17,	2
34,	36,	46,	58,	74,	94

Form E

7,	8,	9,	10,	11,	12
10,	9,	8,	7,	6,	5
6,	8,	10,	12,	14,	16
5,	8,	11,	14,	17,	20
16,	14,	12,	10,	8,	6
5,	6,	8,	11,	15,	20
27,	28,	31,	32,	35,	36
32,	30,	29,	27,	26,	24
27,	29,	32,	34,	37,	39
43,	47,	49,	53,	55,	59
33,	42,	51,	60,	69,	78
30,	33,	39,	48,	60,	75
41,	39,	34,	32,	27,	25
47,	42,	39,	34,	31,	26
51,	49,	45,	39,	34,	21

Fig. 15. Group Examinations *a* and *b*. Four Forms, Test 8, Number Series Completion.

EXAMINATION a

Test 9 Analogies.

Form B

1 dog—bark cat—fur, chase, mew, mouse) 1
2 fool—man bird—feather, hard, cat, leg 2
3 water—fish air—(spark, gas, blame, breathe) 3
4 dog—puppy cat—kitten, dog, tiger, horse 4
5 door—house gate—(swing, hinges, yard, latch) 5
6 sash—face sweep—(floor, broom, straw, clean) 6
7 white—black good—(nice, clothes, bad, mother) 7
8 boy—man lamb—(sheep, dog, shepherd, wool) 8
9 roof—house hat—(button, shoe, straw, head) 9
10 camp—safe battle—(arm, field, fight, dangerous) 10
11 pan—tin table—(chair, wood, legs, dishes) 11
12 left—right west—(north, direction, east, north) 12
13 ocean—pond deep—(sea, well, shallow, steep) 13
14 floor—ceiling ground—(earth, hill, grass, sky) 14
15 cold—ice heat—(wet, cold, steam, stars, sun) 15
16 hat—head thimble—(new, cloth, finger, hand) 16
17 Monday—Tuesday Friday—(week, Thursday, day, Saturday) 17
18 bird—toilet gold—(paper, coin, silver, copper) 18
19 cellar—attic bottom—(wall, tub, top, house) 19
20 man—arm tree—(bush, limb, flower, bark) 20
21 sentence—clothing purse—(purchase, money, strong, stolen) 21
22 knitting—girls carpentry—(trade, lumber, boys, brother) 22
23 shoe—hat leather—(shoe, bark, coat, soft) 23
24 steamer—boat railroad—(gauge, train, crossing, accident) 24
25 scorpion—man sting—(gun, hurt, bee, hand) 25
26 engineer—chauffeur locomotive—(iron, stack, engine, auto) 26
27 skin—body bark—(tree, dog, bite, leaf) 27
28 terrier—dog Jersey—(cattle, cow, horse, state) 28
29 cannon—gun rifle—(ball, small, bore, shoot) 29
30 esteem—friends despise—(contempt, forsake, detest, people) 30
31 tears—laughter sorrow—(joy, distress, funeral, sad) 31
32 yes—no affirmative—(win, debate, deny, negative) 32
33 dismal—dark cheerful—(fun, bright, house, gloomy) 33
34 establish—abolish begin—(work, year, end, commence) 34
35 order—confusion peace—(part, treaty, war, enemy) 35
36 education—ignorance wealth—(poverty, riches, health, comfort) 36
37 10—100 1000—money (10000, 20000, wealth) 37
38 hope—happiness despair—(grave, repair, death, grief) 38
39 imitate—copy invent—(study, invention, machine, originate) 39
40 historian—facts novelist—(fiction, Dickens, writer, book) 40

Form C

1 eat—bread drink—(water, drunk, cup, swallow) 1
2 father—son mother—(aunt, daughter, nephew, sister) 2
3 bird—sings dog—(coat, sheep, bones, run) 3
4 love—hatred friend—(door, mother, tool, enemy) 4
5 sailor—navy soldier—(gun, private, army, fight) 5
6 engineer—locomotive chauffeur—(drive, noise, wagon, auto) 6
7 grass—cattle bread—(meat, butter, water, bones) 7
8 carpenter—house : shoemaker—(thread, wax, shoe, leather) 8
9 shoestring—shoe : button—(coat, cloth, hole, button) 9
10 tiger—wild : cat—(dog, money, tame, pet) 10
11 legs—man : wheels—(carriage, dogs, spokes, tires) 11
12 feather—float rock—(iron, sink, hill, break) 12
13 food—man fuel—(engine, turn, coal, water) 13
14 sled—runner buggy—(horse, carriage, harness, shaft) 14
15 beehive—donkey : honeycomb—(hen, eat, dog, speak) 15
16 fin—fish : wing—(fly, air, bird, sail) 16
17 paper—wall carpet—(tack, grass, floor, sweep) 17
18 north—south east—(north, west, south, east) 18
19 Wednesday—week July—(year, August, month, summer) 19
20 poison—death food—(eat, bird, life, bad) 20
21 angels—heaven : men—(earth, women, boys, paradise) 21
22 Washington—Wilson first—(contest, best, second, last) 22
23 quinine—bitter : sugar—(cane, salt, beets, sweet) 23
24 prince—princess : king—(queen, palace, president, kingdom) 24
25 wrist—bracelet neck—(leg, foot, giraffe, collar) 25
26 able—unable : strong—(weak, able, big, [illegible]) 26
27 Japanese—Japan : Chinese—(Russia, China, Japanese, population) 27
28 add—subtract multiply—(add, divide, arithmetic, increase) 28
29 past—present yesterday—(today, tomorrow, Christmas, gone) 29
30 birth—death planting—(harvest, corn, spring, wheat) 30
31 horse—mule obedient—(disgraceful, donkey, stubborn, obey) 31
32 winter—books bee—(hive, honey, wasp, sting) 32
33 light—dark noise—(report, music, silence, sound) 33
34 behind—late before—(after, soon, early, dinner) 34
35 northpole—equator frigid—(cool, Canada, cold, torrid) 35
36 success—failure joy—(pleasure, sadness, work, fun) 36
37 prosperity—happiness adversity—(success, sorrow, fun, rare) 37
38 character—complexion important—(trivial, event, fate, eye) 38
39 imitate—invent copy—(write, pencil, originate, draw) 39
40 advice—command persuasion—(help, aid, urging, compulsion) 40

Form D

1 bay—sell come—(soon, bear, go, gone) 1
2 spring—summer autumn—(warm, harvest, winter, rise) 2
3 devil—angel bad—(mean, disobedient, defamed, good) 3
4 pup—dog lamb—(wool, hot, sheep, dog) 4
5 fin—wing fish—(blue, swim, scale, bird) 5
6 blonde—light brunette—(hair, brilliant, blonde, dark) 6
7 cat—tiger dog—(bark, bite, wolf, snap) 7
8 winter—season January—(February, day, month, Christmas) 8
9 chew—teeth smell—(sweet, stink, nose, odor) 9
10 good—bad king—(tall, big, small, slow) 10
11 finger—hand toe—(body, skin, foot, nail) 11
12 devil—bad angel—(Gabriel, good, face, heaven) 12
13 skating—winter swimming—(diving, floating, summer, lake) 13
14 lion—roar dog—(drive, pony, bark, harness) 14
15 egg—bird seed—(grow, plant, crack, grain) 15
16 palace—king hut—(peasant, cottage, farm, city) 16
17 dig—trench build—(run, house, spade, toilet) 17
18 love—friend hate—(malice, saint, enemy, dislike) 18
19 agree—quarrel friend—(comrade, enemy, need, [illegible]) 19
20 man—wheat shell—(grind, kernel, hard, husk) 20
21 Washington—Wilson first—(president, second, last, Bryan) 21
22 diamond—rare iron—(copper, silver, ore, steel) 22
23 yes—affirmative : no—(think, knowledge, yes, negative) 23
24 hour—day day—(week, night, hour, noon) 24
25 eye—head window—(key, floor, room, door) 25
26 parents—command children—(men, shall, women, obey) 26
27 clothes—man hair—(shave, comb, hand, hat) 27
28 drama—picture make—(destroy, table, break, work) 28
29 automobile—engine motorcycle—(ride, speed, horse, car) 29
30 grammar—school library—(read, books, paper, chair) 30
31 Caucasian—English Mongolian—(Chinese, Indian, Negro, yellow) 31
32 Indiana—United States part—(chair, China, Ohio, chair) 32
33 esteem—despise friendship—(quarrels, enemies, lovers, [illegible]) 33
34 ship—bay start—(sail, harbor, bay, land) 34
35 abundant—scarce cheap—(say, costly, bargain, market) 35
36 whole—large thunder—(loud, rain, lightning, kill) 36
37 music—harmony noise—(hear, discord, sound, [illegible]) 37
38 best—worst success—([illegible], happy, [illegible]) 38
39 wound—pain [illegible] (hurt, sickness, disease, [illegible]) 39
40 reward—hero punish—(God, everlasting, pain, [illegible]) 40

Form E

1 finger—hand toe—(foot, knee, arm, [illegible]) 1
2 December—Christmas November—(month, Thanksgiving, December, early) 2
3 above—top below—(above, bottom, sea, hang) 3
4 sit—chair sleep—(bed, rest, wake, snore) 4
5 spoon—soup fork—(knife, plate, meat, cup) 5
6 bird—song man—(speech, woman, boy, work) 6
7 skirts—girl : trousers—(boy, hat, vest, coat) 7
8 corn—horse bread—(daily, flour, man, butter) 8
9 officer—private command—(army, general, obey, regiment) 9
10 Edison—phonograph Columbus—(America, Washington, Spain, Ohio) 10
11 cold—heat ice—(cream, frost, refrigerator, steam) 11
12 wolf—sheep cat—(fur, kitten, dog, mouse) 12
13 sweet—sugar sour—(sweet, bread, meat, vinegar) 13
14 hunter—gun fisherman—(fish, bold, wet, net) 14
15 uncle—nephew aunt—(money, brother, sister, [illegible]) 15
16 giant—large dwarf—(young, small, guard, ugly) 16
17 rafters—house skeleton—(house, skull, grave, body) 17
18 cannon—rifle [illegible] (shot, rifle, army, [illegible]) 18
19 engineer—engine driver—(large, harness, passenger, train) 19
20 house—cellar shower—(bath, flood, water, spring) 20
21 pitcher—bath vase—(flowers, pitcher, table, pottery) 21
22 blonde—brunette light—(heavy, electricity, dark, night) 22
23 abundant—[illegible] scarce—(rain, plentiful, [illegible]) 23
24 polite—impolite pleasant—([illegible], automobile, rain, [illegible]) 24
25 large—elephant road—(wide, car, [illegible]) 25
26 succeed—fail praise—([illegible], friend, [illegible], blame) 26
27 theatre—people hive—([illegible], sting, bees, thick) 27
28 peace—happiness war—([illegible], [illegible], battle, [illegible]) 28
29 dismal—cheerful : dark—(sad, stars, night, bright) 29
30 complex—simple hard—(easy, [illegible]) 30
31 music—noise harmony—([illegible], [illegible]) 31
32 truth—gentleman : lie—(pascal, live, give, falsehood) 32
33 [illegible] 33
34 [illegible] 34
35 hospital—patient prison—(cell, criminal, bar, [illegible]) 35
36 [illegible] 36
37 [illegible] 37
38 [illegible] 38
39 a—b : c—(e, d, b, letter) 39
40 fear—[illegible] ([illegible], express, resist) 40

Fig. 16.—Group Examinations *a* and *b*, Four Forms, Test 9, Analogies.

EXAMINATION a

Test 10 Number Comparison

Form B

Samples		Begin Here							
34	31	43	34	48	36	83	34	55	94
79	48	68	97	69	82	82	92	97	25
87	66	74	53	45	79	58	25	61	83
68	26	37	28	81	50	41	67	74	41
25	60	59	95	58	91	57	26	80	57
82	98	85	41	37	64	29	83	48	92
27	33	76	24	99	97	24	58	53	28
30	23	62	76	35	83	65	29	46	70
19	52	40	69	76	38	46	67	72	26
24	78	71	87	88	45	70	74	59	39

406	656	239	622	614	365
920	302	661	989	650	532
797	750	424	236	682	281
166	901	489	504	811	946
658	252	157	348	955	529
641	404	926	291	717	348
684	575	398	587	633	713
779	621	873	883	692	929
912	267	159	680	759	854
123	681	734	775	646	277

3731	6879	4371	3887	2123	9365
8479	2971	7142	8255	9794	6187
2836	7364	3960	9655	6491	4020
9452	3787	8832	4090	7199	3861
8240	5348	1794	7582	1925	5713
2918	7736	5835	3101	1667	2572
4937	4397	2949	7643	8423	8439
5293	2178	1106	6225	3184	7321
3655	9876	9143	9834	5963	2437
2074	8585	6569	5467	4552	8413

Form C

Samples		Begin Here							
34	31	92	54	62	34	85	98	41	36
79	48	46	88	55	83	41	31	73	59
87	66	83	31	46	73	26	76	37	28
68	26	25	87	21	24	30	40	44	63
25	60	60	55	77	66	58	25	36	41
82	98	28	60	90	74	87	88	94	97
27	33	81	33	49	29	92	69	59	22
30	23	49	46	24	58	64	29	88	83
19	52	44	49	43	95	29	87	69	45
24	78	87	82	38	47	33	51	96	74

714	336	363	285	925	723
449	548	935	729	121	882
680	959	675	392	358	435
652	270	248	579	624	840
315	482	241	997	930	789
521	495	760	456	283	764
887	734	512	864	707	451
873	248	820	333	172	749
945	862	534	279	339	577
321	677	454	615	786	916

2160	2645	6701	6398	3901	4341
7641	8273	3985	3602	9272	3125
1948	4786	8829	5181	1685	7193
6475	1821	3804	1234	3668	5074
5935	6517	7822	2989	3601	7509
1435	3014	8102	7353	2563	7229
6953	9059	4664	1727	7064	5372
3007	4947	5073	1140	8057	3527
9522	1411	9081	8106	8136	8058
4028	9145	5591	3715	1563	4756

Form D

Samples		Begin Here							
34	31	82	75	32	32	72	24	71	62
79	48	26	81	26	74	36	53	88	41
87	66	56	53	78	21	63	51	48	97
68	26	76	68	21	80	30	66	65	60
25	60	25	78	83	47	98	59	50	89
82	98	41	32	64	23	97	20	34	54
27	33	65	34	95	98	56	72	27	98
30	23	33	79	76	85	45	86	25	43
19	52	94	36	46	89	86	48	99	66
24	78	62	47	84	96	63	67	93	75

179	583	667	402	331	417
823	472	982	648	739	187
199	301	169	208	250	840
673	236	361	731	828	786
962	730	791	779	620	132
236	708	236	640	720	387
926	827	627	743	699	664
129	364	400	887	239	973
352	609	154	344	943	230
495	985	549	385	428	552

5065	4956	2672	3266	4968	4260
2995	2640	7773	5472	2377	5066
8758	6574	4221	1417	6439	8875
1115	9520	8039	2778	7800	3684
8236	6015	6242	9091	1724	7485
6163	2530	7843	8600	7432	2973
1450	7257	1858	7713	3321	9044
9118	8213	3300	9405	2158	5795
3113	3418	5178	9119	7255	8523
7388	5896	1498	1604	4826	6224

Form E

Samples		Begin Here							
34	31	45	79	26	59	24	78	63	37
79	48	98	21	69	62	81	29	96	41
87	66	38	48	54	25	79	51	42	80
68	26	67	85	23	40	66	30	95	46
25	60	74	37	71	21	30	97	51	28
82	98	84	97	63	26	88	76	98	63
27	33	96	42	99	77	33	92	86	25
30	23	39	62	37	64	25	39	45	52
19	52	53	23	82	63	37	24	76	89
24	78	89	52	46	38	52	66	67	74

414	113	821	846	377	432
377	441	388	951	645	716
522	690	977	273	215	388
997	688	377	740	566	266
885	724	681	202	859	873
285	916	924	668	233	661
926	162	702	214	910	749
767	369	498	812	788	238
241	485	891	447	968	928
627	707	587	405	449	519

4267	4602	2096	2002	2143	4536
1612	8863	6869	6926	1612	3732
7871	3540	5371	5039	9001	6937
3316	6690	6063	2391	3168	3241
8120	1358	4798	1648	3040	7545
2478	0588	2474	7280	7679	2848
6533	6423	9400	8295	2615	2158
5025	7913	9645	3563	1776	6450
4819	1117	8437	1837	1744	4854
9604	2678	5854	1794	7557	6263

Fig. 17.—Group Examinations *a* and *b*, Four Forms, Test 10, Number Comparison.

SECTION 7.—*Examination alpha.*

In the following 8 pages the tests of examination alpha, form 5, are reproduced in order. Tests 5, 6, 7, and 8, as actually bound in the booklet 8½ by 11 inches were printed upside down—test 5 on the back of the booklet, and tests 6, 7, and 8 opposite tests 4, 3, and 2. Forms 6, 7, 8, and 9 of each test except test 1 are reproduced on pages 228 to 234 and are marked to indicate the correct responses. All forms of test 1 are identical as far as the blank is concerned, but differed in the instructions. For correct responses see instructions, Examiner's Guide, second revision, pages 157 to 159.

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FORM 5 GROUP EXAMINATION ALPHA GROUP NO.....

Name ..... Rank..... Age.....

Company..... Regiment..... Arm..... Division.....

In what country or state born?..... Years in U. S.?..... Race.....

Occupation..... Weekly Wages.....

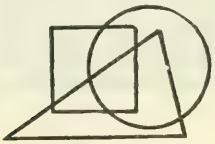
Schooling: Grades, 1. 2. 3. 4. 5. 6. 7. 8: High or Prep. School, Year 1. 2. 3. 4: College, Year 1. 2. 3. 4.

TEST 1

1. ○ ○ ○ ○ ○

2. ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

3.

4. 

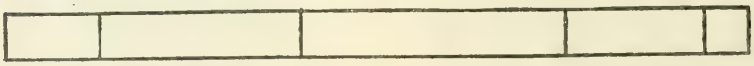
5. ○ ○ ○ *Yes No*

6. ○ ○ ○ ○ ○

7. **A B C D E F G H I J K L M N O P**

8. ○ ○ ○ *MILITARY GUN CAMP*

9. **34-79-56-87-68-25-82-47-27-31-64-93-71-41-52-99**

10. 

11.

12. **1 2 3 4 5 6 7 8 9**

Division of Psychology, Medical Department U. S. A.
Authorized by the Surgeon General, Feb. 8 1918, Edition, July 9, 1918, 200,000

Fig. 18.—Group Examination Alpha, Form 5, Test 1, Oral Directions.

TEST 2

Get the answers to these examples as quickly as you can.
Use the side of this page to figure on if you need to.

SAMPLES
1 How many are 5 men and 10 men?.....Answer (15)
2 If you walk 4 miles an hour for 3 hours, how far do you walk?.....Answer (12)

1 How many are 30 men and 7 men?.....Answer (37)
2 If you save $7 a month for 4 months, how much will you save? Answer ($28)
3 If 24 men are divided into squads of 8, how many squads will there be?.....Answer (3)
4 Mike had 12 cigars. He bought 3 more, and then smoked 6. How many cigars did he have left?.....Answer (9)
5 A company advanced 5 miles and retreated 3 miles. How far was it then from its first position?.....Answer (2)
6 How many hours will it take a truck to go 66 miles at the rate of 6 miles an hour?.....Answer (11)
7 How many cigars can you buy for 50 cents at the rate of 2 for 5 cents?.....Answer (20)
8 A regiment marched 40 miles in five days. The first day they marched 9 miles, the second day 6 miles, the third 10 miles, the fourth 8 miles. How many miles did they march the last day?.....Answer (7)
9 If you buy two packages of tobacco at 7 cents each and a pipe for 65 cents, how much change should you get from a two-dollar bill?.....Answer ($1.21)
10 If it takes 6 men 3 days to dig a 180-foot drain, how many men are needed to dig it in half a day?.....Answer (36)
11 A dealer bought some mules for $800. He sold them for $1,000, making $40 on each mule. How many mules were there?. Answer (5)
12 A rectangular bin holds 400 cubic feet of lime. If the bin is 10 feet long and 5 feet wide, how deep is it?.....Answer (8)
13 A recruit spent one-eighth of his spare change for post cards and four times as much for a box of letter paper, and then had 90 cents left. How much money did he have at first?....Answer ($2.40)
14 If 3½ tons of coal cost $21, what will 5½ tons cost?....Answer ($33.00)
15 A ship has provisions to last her crew of 500 men 6 months. How long would it last 1,200 men?.....Answer (2½ mos)
16 If a man runs a hundred yards in 10 seconds, how many feet does he run in a fifth of a second?.....Answer (6)
17 A U-boat makes 8 miles an hour under water and 15 miles on the surface. How long will it take to cross a 100-mile channel, if it has to go two-fifths of the way under water?.....Answer (9)
18 If 241 squads of men are to dig 4,097 yards of trench, how many yards must be dug by each squad?.....Answer (17)
19 A certain division contains 3,000 artillery, 15,000 infantry and 1,000 cavalry. If each branch is expanded proportionately until there are in all 20,900 men, how many will be added to the artillery?.....Answer (300)
20 A commission house which had already supplied 1,897 barrels of apples to a cantonment delivered the remainder of its stock to 29 mess halls. Of this remainder each mess hall received 54 barrels. What was the total number of barrels supplied?. Answer (3463)

Fig. 19. Group Examination Alpha, Form 5, Test 2. Arithmetical Problems.

TEST 3

This is a test of common sense. Below are sixteen questions. Three answers are given to each question. You are to look at the answers carefully; then make a cross in the square before the best answer to each question, as in the sample:

SAMPLE
Why do we use stoves? Because
- ☐ they look well
- ☒ they keep us warm
- ☐ they are black

Here the second answer is the best one and is marked with a cross. Begin with No. 1 and keep on until time is called.

1 Cats are useful animals, because
- ☒ they catch mice
- ☐ they are gentle
- ☐ they are afraid of dogs

2 Why are pencils more commonly carried than fountain pens? Because
- ☐ they are brightly colored
- ☒ they are cheaper
- ☐ they are not so heavy

3 Why is leather used for shoes? Because
- ☐ it is produced in all countries
- ☒ it wears well
- ☐ it is an animal product

4 Why judge a man by what he does rather than by what he says? Because
- ☒ what a man does shows what he really is
- ☐ it is wrong to tell a lie
- ☐ a deaf man cannot hear what is said

5 If you were asked what you thought of a person whom you didn't know, what should you say?
- ☐ I will go and get acquainted
- ☐ I think he is all right
- ☒ I don't know him and can't say

6 Streets are sprinkled in summer
- ☐ to make the air cooler
- ☐ to keep automobiles from skidding
- ☒ to keep down dust

7 Why is wheat better for food than corn? Because
- ☒ it is more nutritious
- ☐ it is more expensive
- ☐ it can be ground finer

8 If a man made a million dollars, he ought to
- ☐ pay off the national debt
- ☒ contribute to various worthy charities
- ☐ give it all to some poor man

☞ Go to No. 9 above

9 Why do many persons prefer automobiles to street cars? Because
- ☐ an auto is made of higher grade materials
- ☒ an automobile is more convenient
- ☐ street cars are not as safe

10 The feathers on a bird's wings help him to fly because they
- ☒ make a wide, light surface
- ☐ keep the air off his body
- ☐ keep the wings from cooling off too fast

11 All traffic going one way keeps to the same side of the street because
- ☐ most people are right handed
- ☐ the traffic policeman insists on it
- ☒ it avoids confusion and collisions

12 Why do inventors patent their inventions? Because
- ☒ it gives them control of their inventions.
- ☐ it creates a greater demand
- ☐ it is the custom to get patents

13 Freezing water bursts pipes because
- ☐ cold makes the pipes weaker
- ☒ water expands when it freezes
- ☐ the ice stops the flow of water

14 Why are high mountains covered with snow? Because
- ☐ they are near the clouds
- ☐ the sun seldom shines on them
- ☒ the air is cold there

15 If the earth were nearer the sun
- ☐ the stars would disappear
- ☐ our months would be longer
- ☒ the earth would be warmer

16 Why is it colder nearer the poles than near the equator? Because
- ☐ the poles are always farther from the sun
- ☒ the sunshine falls obliquely at the poles
- ☐ there is more ice at the poles

Fig. 20.—Group Examination Alpha, Form 5, Test 3, Practical Judgment.

TEST 4

If the two words of a pair mean the same or nearly the same, draw a line under *same*. If they mean the opposite or nearly the opposite, draw a line under *opposite*. If you cannot be sure, guess. The two samples are already marked as they should be.

SAMPLES { good—bad ..... same—opposite
little—small ..... same—opposite

1	wet—dry	same—opposite	1
2	in—out	same—opposite	2
3	hill—valley	same—opposite	3
4	allow—permit	same—opposite	4
5	expand—contract	same—opposite	5
6	class—group	same—opposite	6
7	former—latter	same—opposite	7
8	confess—admit	same—opposite	8
9	shy—timid	same—opposite	9
10	delicate—tender	same—opposite	10
11	extinguish—quench	same—opposite	11
12	cheerful—melancholy	same—opposite	12
13	accept—reject	same—opposite	13
14	concave—convex	same—opposite	14
15	lax—strict	same—opposite	15
16	assert—maintain	same—opposite	16
17	champion—advocate	same—opposite	17
18	adapt—conform	same—opposite	18
19	debase—exalt	same—opposite	19
20	dissension—harmony	same—opposite	20
21	repress—restrain	same—opposite	21
22	bestow—confer	same—opposite	22
23	amenable—tractable	same—opposite	23
24	avert—prevent	same—opposite	24
25	reverence—veneration	same—opposite	25
26	fallacy—verity	same—opposite	26
27	specific—general	same—opposite	27
28	pompous—ostentatious	same—opposite	28
29	accumulate—dissipate	same—opposite	29
30	apathy—indifference	same—opposite	30
31	effeminate—virile	same—opposite	31
32	peculation—embezzlement	same—opposite	32
33	benign—genial	same—opposite	33
34	acme—climax	same—opposite	34
35	largess—donation	same—opposite	35
36	innuendo—insinuation	same—opposite	36
37	vesper—matin	same—opposite	37
38	aphorism—maxim	same—opposite	38
39	abjure—renounce	same—opposite	39
40	encomium—eulogy	same—opposite	40

Fig. 21.—Group Examination Alpha, Form 5, Test 4, Synonym—Antonym.

TEST 5

The words A EATS COW GRASS in that order are mixed up and don't make a sentence; but they would make a sentence if put in the right order: A COW EATS GRASS, and this statement is true.

Again, the words HORSES FEATHERS HAVE ALL would make a sentence if put in the order ALL HORSES HAVE FEATHERS, but this statement is false.

Below are twenty-four mixed-up sentences. Some of them are true and some are false. When I say "go," take these sentences one at a time. Think what each would say if the words were straightened out, but don't write them yourself. Then, if what it would say is true, draw a line under the word "true"; if what it would say is false, draw a line under the word "false." If you can not be sure, guess. The two samples are already marked as they should be. Begin with No. 1 and work right down the page until time is called.

SAMPLES	a eats cow grass	true	false	
	horses feathers have all	true	false	
1	lions strong are	true	false	1
2	houses people in live	true	false	2
3	days there in are week eight a	true	false	3
4	leg flies one have only	true	false	4
5	months coldest are summer the	true	false	5
6	gotten sea water sugar is from	true	false	6
7	honey bees flowers gather the from	true	false	7
8	and eat good gold silver to are	true	false	8
9	president Columbus first the was America of	true	false	9
10	making is bread valuable wheat for	true	false	10
11	water and made are butter from cheese	true	false	11
12	sides every has four triangle	true	false	12
13	every times makes mistakes person at	true	false	13
14	many toes fingers as men as have	true	false	14
15	not eat gunpowder to good is	true	false	15
16	ninety canal ago built Panama years was the	true	false	16
17	live dangerous is near a volcano to it	true	false	17
18	clothing worthless are for and wool cotton	true	false	18
19	as sheets are napkins used never	true	false	19
20	people trusted intemperate be always can	true	false	20
21	employ debaters irony never	true	false	21
22	certain some death of mean kinds sickness	true	false	22
23	envy bad malice traits are and	true	false	23
24	repeated call human for courtesies associations	true	false	24

Fig. 22.—Group Examination Alpha, Form 5, Test 5, Disarranged Sentences.

TEST 6

SAMPLES	2	4	6	8	10	12	14	16
	9	8	7	6	5	4	3	2
	2	2	3	3	4	4	5	5
	1	7	2	7	3	7	4	7

Look at each row of numbers below, and on the two dotted lines write the two numbers that should come next.

3	4	5	6	7	8	9	10
10	15	20	25	30	35	40	45
8	7	6	5	4	3	2	1
3	6	9	12	15	18	21	24
5	9	13	17	21	25	29	33
8	1	6	1	4	1	2	1
27	27	23	23	19	19	15	15
1	2	4	8	16	32	64	128
8	9	12	13	16	17	20	21
9	9	7	7	5	5	3	3
19	16	14	11	9	6	4	1
2	3	5	8	12	17	23	30
11	13	12	14	13	15	14	16
29	28	26	23	19	14	8	1
18	14	17	13	16	12	15	11
81	27	9	3	1	⅓	1/9	1/27
20	17	15	14	11	9	8	5
16	17	15	18	14	19	13	20
1	4	9	16	25	36	49	64
3	6	8	16	18	36	38	76

Fig. 23.—Group Examination Alpha, Form 5, Test 6, Number Series Completion.

TEST 7

SAMPLES
- sky—blue :: grass— table **green** warm big
- fish—swims :: man— paper time **walks** girl
- day—night :: white— red **black** clear pure

In each of the lines below, the first two words are related to each other in some way. What you are to do in each line is to see what the relation is between the first two words, and underline the word in heavy type that is related in the same way to the third word. Begin with No. 1 and mark as many sets as you can before time is called.

1	gun—shoots :: knife— run **cuts** hat bird	1
2	ear—hear :: eye— table hand **see** play	2
3	dress—woman :: feathers— **bird** neck feet bill	3
4	handle—hammer :: knob— key room shut **door**	4
5	shoe—foot :: hat— coat nose **head** collar	5
6	water—drink :: bread— cake coffee **eat** pie	6
7	food—man :: gasoline— gas oil **automobile** spark	7
8	eat—fat :: starve— **thin** food bread thirsty	8
9	man—home :: bird— fly insect worm **nest**	9
10	go—come :: sell— leave **buy** money papers	10
11	peninsula—land :: bay— boats pay **ocean** Massachusetts	11
12	hour—minute :: minute— man week **second** short	12
13	abide—depart :: stay— over home play **leave**	13
14	January—February :: June— **July** May month year	14
15	bold—timid :: advance— proceed **retreat** campaign soldier	15
16	above—below :: top— spin **bottom** surface side	16
17	lion—animal :: rose— smell leaf **plant** thorn	17
18	tiger—carnivorous :: horse— cow pony buggy **herbivorous**	18
19	sailor—navy :: soldier— gun cap hill **army**	19
20	picture—see :: sound— noise music **hear** bark	20
21	success—joy :: failure— **sadness** success fail work	21
22	hope—despair :: happiness— frolic fun joy **sadness**	22
23	pretty—ugly :: attract— fine **repel** nice draw	23
24	pupil—teacher :: child— **parent** doll youngster obey	24
25	city—mayor :: army— navy soldier **general** private	25
26	establish—begin :: abolish— slavery wrong abolition **end**	26
27	December—January :: last— least worst month **first**	27
28	giant—dwarf :: large— big monster queer **small**	28
29	engine—caboose :: beginning— commence cabin **end** train	29
30	dismal—cheerful :: dark— sad stars night **bright**	30
31	quarrel—enemy :: agree— **friend** disagree agreeable foe	31
32	razor—sharp :: hoe— bury **dull** cuts tree	32
33	winter—summer :: cold— freeze **warm** wet January	33
34	rudder—ship :: tail— sail **bird** dog cat	34
35	granary—wheat :: library— desk **books** paper librarian	35
36	tolerate—pain :: welcome— **pleasure** unwelcome friends give	36
37	sand—glass :: clay— stone hay **bricks** dirt	37
38	moon—earth :: earth— ground Mars **sun** sky	38
39	tears—sorrow :: laughter— **joy** smile girls grin	39
40	cold—ice :: heat— lightning warm **steam** coat	40

Fig. 24.—Group Examination Alpha, Form 5, Test 7, Analogies.

TEST 8

Notice the sample sentence:

People hear with the eyes ears nose mouth

The correct word is ears, because it makes the truest sentence.

In each of the sentences below you have four choices for the last word. Only one of them is correct. In each sentence draw a line under the one of these four words which makes the truest sentence. If you can not be sure, guess. The two samples are already marked as they should be.

SAMPLES
- People hear with the eyes ears nose mouth
- France is in Europe Asia Africa Australia

1 America was discovered by Drake Hudson Columbus Cabot 1
2 Pinochle is played with rackets cards pins dice 2
3 The most prominent industry of Detroit is automobiles brewing flour packing 3
4 The Wyandotte is a kind of horse fowl cattle granite 4
5 The U. S. School for Army Officers is at Annapolis West Point New Haven Ithaca 5

6 Food products are made by Smith & Wesson Swift & Co. W. L. Douglas B. T. Babbitt 6
7 Bud Fisher is famous as an actor author baseball player comic artist 7
8 The Guernsey is a kind of horse goat sheep cow 8
9 Marguerite Clark is known as a suffragist singer movie actress writer 9
10 "Hasn't scratched yet" is used in advertising a duster flour brush cleanser 10

11 Salsify is a kind of snake fish lizard vegetable 11
12 Coral is obtained from mines elephants oysters reefs 12
13 Rosa Bonheur is famous as a poet painter composer sculptor 13
14 The tuna is a kind of fish bird reptile insect 14
15 Emeralds are usually red blue green yellow 15

16 Maize is a kind of corn hay oats rice 16
17 Nabisco is a patent medicine disinfectant food product tooth paste 17
18 Velvet Joe appears in advertisements of tooth powder dry goods tobacco soap 18
19 Cypress is a kind of machine food tree fabric 19
20 Bombay is a city in China Egypt India Japan 20

21 The dictaphone is a kind of typewriter multigraph phonograph adding machine 21
22 The pancreas is in the abdomen head shoulder neck 22
23 Cheviot is the name of a fabric drink dance food 23
24 Larceny is a term used in medicine theology law pedagogy 24
25 The Battle of Gettysburg was fought in 1863 1813 1778 1812 25

26 The bassoon is used in music stenography book-binding lithography 26
27 Turpentine comes from petroleum ore hides trees 27
28 The number of a Zulu's legs is two four six eight 28
29 The scimitar is a kind of musket cannon pistol sword 29
30 The Knight engine is used in the Packard Lozier Stearns Pierce Arrow 30

31 The author of "The Raven" is Stevenson Kipling Hawthorne Poe 31
32 Spare is a term used in bowling football tennis hockey 32
33 A six-sided figure is called a scholium parallelogram hexagon trapezium 33
34 Isaac Pitman was most famous in physics shorthand railroading electricity 34
35 The ampere is used in measuring wind power electricity water power rainfall 35

36 The Overland car is made in Buffalo Detroit Flint Toledo 36
37 Mauve is the name of a drink color fabric food 37
38 The stanchion is used in fishing hunting farming motoring 38
39 Mica is a vegetable mineral gas liquid 39
40 Scrooge appears in Vanity Fair The Christmas Carol Romola Henry IV 40

Fig. 23.—Group Examination Alpha, Form 5, Test 8, Information.

EXAMINATION ALPHA

Test 2. Arithmetical Problems

Form 6

1 How many are 40 guns and 6 guns? Answer (46)
2 If you save $6 a month for 5 months, how much will you save? Answer (30)
3 If 32 men are divided into squads of 8, how many squads will there be? Answer (4)
4 Mike had 11 cigars. He bought 3 more and then smoked 6. How many cigars did he have left? Answer (8)
5 A company advanced 6 miles and retreated 3 miles. How far was it then from its first position? Answer (3)
6 How many hours will it take a truck to go 48 miles at the rate of 4 miles an hour? Answer (12)
7 How many pencils can you buy for 40 cents at the rate of 2 for 5 cents? Answer (16)
8 A regiment marched 40 miles in five days. The first day they marched 9 miles, the second day 6 miles, the third 10 miles, the fourth 9 miles. How many miles did they march the last day? Answer (6)
9 If you buy 2 packages of tobacco at 8 cents each and a pipe for 55 cents, how much change should you get from a two-dollar bill? Answer ($1.29)
10 If it takes 8 men 2 days to dig a 160-foot drain, how many men are needed to dig it in half a day? Answer (32)
11 A dealer bought some mules for $900. He sold them for $1,000, making $25 on each mule. How many mules were there? Answer (4)
12 A rectangular bin holds 600 cubic feet of lime. If the bin is 10 feet wide and 5 feet deep, how long is it? Answer (12)
13 A recruit spent one-eighth of his spare change for post cards and four times as much for a box of letter paper, and then had 60 cents left. How much money did he have at first? Answer ($1.60)
14 If 2½ tons of hay cost $20, what will 4½ tons cost? Answer ($36)
15 A ship has provisions to last her crew of 600 men 6 months. How long would it last 800 men? Answer (4½ mos)
16 If a train goes 200 yards in 10 seconds, how many feet does it go in a fifth of a second? Answer (12)
17 A U-boat makes 10 miles an hour under water and 20 miles on the surface. How long will it take to cross a 100-mile channel, if it has to go three-fifths of the way under water? Answer (8)
18 If 214 squads of men are to dig 4,000 yards of trench, how many yards must be dug by each squad? Answer (19)
19 A certain division contains 2,000 artillery, 15,000 infantry, and 1,000 cavalry. If each branch is expanded proportionately until there are in all 19,800 men, how many will be added to the artillery? Answer (200)
20 A commission house which had already supplied 1,897 barrels of apples to a cantonment delivered the remainder of its stock to 28 mess halls. Of this remainder each mess hall received 47 barrels. What was the total number of barrels supplied? Answer (3213)

Form 7

1 How many are 50 tents and 8 tents? Answer (58)
2 If you save $5 a month for 7 months, how much will you save? Answer ($35)
3 If 40 men are divided into squads of 8, how many squads will there be? Answer (5)
4 Mike had 12 cigars. He bought 2 more and then smoked 7. How many cigars did he have left? Answer (7)
5 A company advanced 7 miles and retreated 2 miles. How far was it then from its first position? Answer (5)
6 How many hours will it take a truck to go 65 miles at the rate of 5 miles an hour? Answer (13)
7 How many pencils can you buy for 30 cents at the rate of 2 for 5 cents? Answer (12)
8 A regiment marched 40 miles in five days. The first day they marched 9 miles, the second day 6 miles, the third 10 miles, the fourth 11 miles. How many miles did they march the last day? Answer (4)
9 If you buy 2 packages of tobacco at 7 cents each and a pipe for 55 cents, how much change should you get from a two-dollar bill? Answer ($1.31)
10 If it takes 7 men 2 days to dig a 140-foot drain, how many men are needed to dig it in half a day? Answer (28)
11 A dealer bought some mules for $1,000. He sold them for $1,200, making $20 on each mule. How many mules were there? Answer (10)
12 A rectangular bin holds 300 cubic feet of lime. If the bin is 10 feet long and 5 feet wide, how deep is it? Answer (6)
13 A recruit spent one-eighth of his spare change for post cards and four times as much for a box of letter paper, and then had 30 cents left How much money did he have at first? Answer ($.80)
14 If 4½ tons of clover cost $36, what will 2½ tons cost? Answer ($20)
15 A ship has provisions to last her crew of 800 men 4 months. How long would it last 1,200 men? Answer (2⅔ mos)
16 If a train goes 150 yards in 10 seconds, how many feet does it go in a fifth of a second? Answer (9)
17 A U-boat goes 10 miles an hour under water and 20 miles an hour on the surface. How long will it take to cross a 100-mile channel if it has to go one-fifth of the way under water? Answer (6)
18 If 341 squads of men are to dig 6,138 yards of trench, how many yards must be dug by each squad? Answer (18)
19 A certain division contains 4,000 artillery, 15,000 infantry, and 1,000 cavalry. If each branch is expanded proportionately until there are in all 22,000 men, how many will be added to the artillery? Answer (400)
20 A commission house which had already supplied 1,897 barrels of apples to a cantonment delivered the remainder of its stock to 27 mess halls. Of this remainder each mess hall received 56 barrels. What was the total number of barrels supplied? Answer (3409)

Form 8.

1 How many are 60 guns and 5 guns? Answer (65)
2 If you save $9 a month for 3 months, how much will you save? Answer (27)
3 If 48 men are divided into squads of 8, how many squads will there be? Answer (6)
4 Mike had 11 cigars. He bought 2 more and then smoked 7. How many cigars did he have left? Answer (6)
5 A company advanced 8 miles and retreated 2 miles. How far was it then from its first position? Answer (6)
6 How many hours will it take a truck to go 42 miles at the rate of 3 miles an hour? Answer (14)
7 How many pencils can you buy for 60 cents at the rate of 2 for 5 cents? Answer (24)
8 A regiment marched 10 miles in five days. The first day they marched 9 miles, the second day 6 miles, the third 10 miles, the fourth 6 miles. How many miles did they march the last day? Answer (9)
9 If you buy 2 packages of tobacco at 8 cents each and a pipe for 65 cents, how much change should you get from a two-dollar bill? Answer ($1.19)
10 If it takes 4 men 3 days to dig a 120-foot drain, how many men are needed to dig it in half a day? Answer (24)
11 A dealer bought some mules for $2,000. He sold them for $2,400 making $50 on each mule. How many mules were there? Answer (8)
12 A rectangular bin holds 200 cubic feet of lime. If the bin is 10 feet long and 5 feet wide, how deep is it? Answer (4)
13 A recruit spent one-eighth of his spare change for post cards and twice as much for a box of letter paper, and then had $1.00 left How much money did he have at first? Answer ($1.60)
14 If 3½ tons of hay cost $14, what will 6½ tons cost? Answer ($26)
15 A ship has provisions to last her crew of 700 men 2 months. How long would it last 400 men? Answer (3½ mos)
16 If an aeroplane goes 250 yards in 10 seconds, how many feet does it go in a fifth of a second? Answer (15)
17 A U-boat makes 8 miles an hour under water and 20 miles on the surface. How long will it take to cross a 100-mile channel, if it has to go two-fifths of the way under water? Answer (8)
18 If 134 squads of men are to dig 3,618 yards of trench, how many yards must be dug by each squad? Answer (27)
19 A certain division contains 5,000 artillery, 15,000 infantry, and 1,000 cavalry. If each branch is expanded proportionately until there are in all 23,100 men, how many will be added to the artillery? Answer (500)
20 A commission house which had already supplied 1,897 barrels of apples to a cantonment delivered the remainder of its stock to 37 mess halls. Of this remainder each mess hall received 54 barrels. What was the total number of barrels supplied? Answer (3895)

Form 9.

1 How many are 20 boats and 9 boats? Answer (29)
2 If you save $4 a month for 9 months, how much will you save? Answer (36)
3 If 64 men are divided into squads of 8, how many squads will there be? Answer (8)
4 Mike had 11 cigars. He bought 3 more and then smoked 8. How many cigars did he have left? Answer (6)
5 A company advanced 6 miles and retreated 2 miles. How far was it then from its first position? Answer (4)
6 How many hours will it take a truck to go 48 miles at the rate of 3 miles an hour? Answer (16)
7 How many cigars can you buy for $1.00 at the rate of 2 for 5 cents? Answer (40)
8 A regiment marched 40 miles in five days. The first day they marched 9 miles, the second day 6 miles, the third 10 miles, the fourth 7 miles. How many miles did they march the last day? Answer (8)
9 If you buy 2 packages of tobacco at 7 cents each and a pipe for 75 cents, how much change should you get from a two-dollar bill? Answer ($1.11)
10 If it takes 5 men 4 days to dig a 200-foot drain, how many men are needed to dig it in half a day? Answer (40)
11 A dealer bought some mules for $1,200. He sold them for $1,500, making $50 on each mule How many mules were there? Answer (6)
12 A rectangular bin holds 500 cubic feet of lime. If the bin is 10 feet long and 5 feet deep, how wide is it? Answer (10)
13 A recruit spent one-eighth of his spare change for post cards and twice as much for a box of letter paper, and then had $2.00 left. How much money did he have at first? Answer ($3.20)
14 If 5½ tons of bark cost $33, what will 3½ tons cost? Answer ($21)
15 A ship has provisions to last her crew of 400 men 6 months. How long would it last 1,600 men? Answer (1½ mos)
16 If an aeroplane goes 300 yards in 10 seconds, how many feet does it go in a fifth of a second? Answer (18)
17 A U-boat goes 6 miles an hour under water and 20 miles an hour on the surface. How long will it take to cross a 100-mile channel, if it has to go three-fifths of the way under water? Answer (12)
18 If 214 squads of men are to dig 5,992 yards of trench, how many yards must be dug by each squad? Answer (28)
19 A certain division contains 6,000 artillery, 15,000 infantry, and 1,000 cavalry. If each branch is expanded proportionately until there are in all 24,200 men, how many will be added to the artillery? Answer (600)
20 A commission house which had already supplied 1,897 barrels of apples to a cantonment delivered the remainder of its stock to 38 mess halls. Of this remainder each mess hall received 45 barrels. What was the total number of barrels supplied? Answer (3607)

Fig. 26.—Group Examination Alpha, Four Forms, Test 2, Arithmetical Problems.

EXAMINATION ALPHA

Test 3. Practical Judgment.

Form 6

If plants are dying for lack of rain, you should
☒ water them
☐ ask a florist's advice
☐ put fertilizer around them

A house is better than a tent, because
☐ it costs more
☒ it is more comfortable
☐ it is made of wood

Why does it pay to get a good education? Because
☒ it makes a man more useful and happy
☐ it makes work for teachers
☐ it makes demand for buildings for schools and colleges

If the grocer should give you too much money in making change what is the right thing to do?
☐ buy some candy of him with it
☐ give it to the first poor man you meet
☒ tell him of his mistake

Why should food be chewed before swallowing?
☒ it is better for the health
☐ it is bad manners to swallow without chewing
☐ chewing keeps the teeth in condition

If you saw a train approaching a broken track you should
☐ telephone for an ambulance
☒ signal the engineer to stop the train
☐ look for a piece of rail to fit in

If you are lost in a forest in the daytime, what is the thing to do?
☐ hurry to the nearest house you know of
☐ look for something to eat
☐ use the sun or a compass for a guide

It is better to fight than to run, because
☐ cowards are shot
☐ it is more honorable
☐ if you run you may get shot in the back

☞ Go to No. 9 above

9 Why are warships painted gray? Because gray paint
☐ is cheaper than other colors
☐ is more durable than other colors
☒ makes the ships harder to see

10 Why should all parents be made to send their children to school? Because
☒ it prepares them for adult life
☐ it keeps them out of mischief
☐ they are too young to work

11 The reason that many birds sing in the spring is
☐ to let us know spring is here
☒ to attract their mates
☐ to exercise their voices

12 Gold is more suitable than iron for making money because
☐ gold is pretty
☐ iron rusts easily
☒ gold is scarcer and more valuable

13 The cause of echoes is
☒ the reflection of sound waves
☐ the presence of electricity in the air
☐ the presence of moisture in the air

14 We see no stars at noon because
☐ they have moved around to the other side of the earth
☒ they are so much fainter than the sun
☐ they are hidden behind the sky

15 Some men lose their breath on high mountains because
☐ the wind blows their breath away
☒ the air is too rare
☐ it is always cold there

16 Why do some men who could afford to own a house live in a rented one? Because
☐ they don't have to pay taxes
☐ they don't have to buy a rented house
☒ they can make more by investing the money the house would cost

Form 7

1 Why are chairs made of wood? Because
☒ wood is cheap and light
☐ wood burns
☐ wood is easily broken

2 If a person asks you for something you do not have
☐ tell him to mind his business
☒ say you don't have it
☐ walk away

3 If it rains when you are starting to go for the doctor, what should you do?
☐ stay at home
☒ take an umbrella
☐ wait until it stops raining

4 If you are in danger of sunstroke what should you do?
☐ take off your shoes
☐ run to the hospital
☒ get in the shade or wet your head

5 If you find a man who has hanged himself, you should
☐ send a notice to the paper
☐ take him home
☒ call a doctor or the police

6 Why is tennis good exercise? Because
☒ it calls for vigorous movement
☐ it demands clear eyes
☐ it is very exciting

7 If while on the march you get bitten by a rattlesnake, you should
☐ kill the snake
☒ suck the poison from the wound
☐ run back to camp and get some whiskey

8 If you are hurrying in an auto to catch a train and come to a broken bridge, what should you do?
☒ go around and try another road
☐ take off your clothes and swim across
☐ hire a horse and ride across

☞ Go to No. 9 above

9 Why do some people think that short men should be admitted to the army? Because
☒ usefulness does not depend on height
☐ they want to enlist
☐ they are more intelligent than tall men

10 If you find a lost 2-year-old baby on a city street, what should you do?
☐ ask him where he lives and take him there
☐ if he is a nice child take him home and keep him
☒ ask the police to help you or leave him with them

11 Electric lights are better than gas lights because electricity
☐ makes a white light
☒ is safer and more convenient
☐ is cheaper

12 Why is a check better than real money? Because
☐ checks are cleaner than bills
☐ you can have all the money you need by writing checks
☒ checks are safer and more convenient

13 Five P.M. is the rush hour on street cars because
☒ work people are going home at that hour
☐ so many people live in the suburbs
☐ street cars are the best cheap means of transportation

14 Why should people not waste food in time of war?
☐ we could eat less and not starve
☒ food is scarce in wartime
☐ food costs money

15 You should not give money to beggars on the street because
☐ it makes it hard for the beggars to get work
☐ it takes away the work of organized charities
☒ it encourages living off others

16 A country should have many railroads, because
☐ they decrease the price of food materials
☒ they make it easy to travel and carry goods
☐ they are good for the steel business

Form 8

It is wiser to put some money aside and not spend it all, so that you may
☐ prepare for old age or sickness
☐ collect all the different kinds of money
☐ gamble when you wish

Shoes are made of leather, because
☐ it is tanned
☐ it is tough, pliable and warm
☐ it can be blackened

Why do soldiers wear wrist watches rather than pocket watches? Because
☐ they keep better time
☐ they are harder to break
☐ they are handier

The main reason why stone is used for building purposes is because
☐ it makes a good appearance
☐ it is strong and lasting
☐ it is heavy

Why is beef better food than cabbage? Because
☐ it tastes better
☐ it is more nourishing
☐ it is harder to obtain

If someone does you a favor, what should you do?
☐ try to forget it
☐ steal for him if he asks you to
☐ return the favor

[illegible] get a letter from home which you [illegible] because
☐ [illegible]
☐ [illegible]
☐ the postal service has been discontinued

[illegible] the farmers [illegible]
☐ supply luxuries
☐ make work for the unemployed
☐ feed the nation

☞ Go to No. 9 above

9 If a man who can't swim should fall into a river, he should
☒ yell for help and try to scramble out
☐ dive to the bottom and crawl out
☐ lie on his back and float

10 Glass insulators are used to fasten telegraph wires because
☐ the glass keeps the pole from being burned
☒ the glass keeps the current from escaping
☐ the glass is cheap and attractive

11 If your load of coal gets stuck in the mud, what should you do?
☐ leave it there
☒ get more horses or men to pull it out
☐ throw off the load

12 Why are criminals locked up?
☒ to protect society
☐ to get even with them
☐ to make them work

13 Why should a married man have his life insured? Because
☐ death may come at any time
☐ insurance companies are usually honest
☒ his family will not then suffer if he dies

14 In Leap Year February has 29 days because
☐ February is a short month
☐ some people are born on February 29th
☒ otherwise the calendar would not come out right

15 If you are held up and robbed in a strange city, you should
☒ apply to the police for help
☐ ask the first man you meet for money to get home
☐ borrow some money at a bank

16 Why should we have Congressmen? Because
☐ the people must be ruled
☐ it insures truly representative government
☒ the people are too many to meet and make their laws

Form 9

1 Cotton fibre is much used for making cloth because
☐ it grows all over the South
☒ it can be spun and woven
☐ it is a vegetable product

2 Thermometers are useful, because
☐ they regulate the temperature
☒ they tell us how warm it is
☐ they contain mercury

3 Why are doctors useful? Because they
☐ understand human nature
☐ always have pleasant dispositions
☒ know more about diseases than others

4 Why ought a grocer to own an automobile? Because
☒ it is useful in his business
☐ it uses rubber tires
☐ it saves railroad fare

5 A machine gun is more deadly than a rifle, because it
☐ was invented more recently
☒ fires more rapidly
☐ can be used with less training

6 Why is the telephone more useful than the telegraph? Because
☒ it gets a quicker answer
☐ it uses more miles of wire
☐ it is a more recent invention

7 Why is wool better than cotton for making winter clothes? Because
☐ wool is cheaper
☒ wool is warmer
☐ it wears longer

8 Why is New York larger than Boston? Because
☐ it has more railroads
☐ it has more millionaires
☒ it is better located

☞ Go to No. 9 above

9 Every soldier should be inoculated against typhoid fever, because
☐ many men have typhoid
☐ the doctors insist on it
☒ it prevents epidemics

10 Theatres are useful institutions because
☐ they employ actors
☒ they afford a method of relaxation
☐ they give the rich a chance to spend their money

11 A train is harder to stop than an automobile because
☐ it is longer
☒ it is heavier
☐ the brakes are not so good

12 Why is winter colder than summer? Because
☒ the sun shines obliquely upon us in winter
☐ January is a cold month
☐ there is much snow in winter

13 Many schools are closed in summer, so that
☐ the teachers may have a vacation
☒ the children shall not be indoors in hot weather
☐ the schoolhouses may be repaired

14 If a drunken man is quarrelsome and insists on fighting you, it is usually better to
☐ knock him down
☒ call the police
☐ leave him alone

15 Why are electrical engineers highly paid? Because
☒ their ability is much in demand
☐ they have a college education
☐ they work long hours

16 Aeroplanes failed for many years because
☐ they were too heavy
☐ the materials cost too much
☒ the motor was not perfected

FIG. 27. Group Examination Alpha, Four Forms, Test 3, Practical Judgment

EXAMINATION ALPHA

Test 4 Synonym - Antonym

Form 6

1	cold—hot	same—opposite	1
2	long—short	same—opposite	2
3	bare—naked	same—opposite	3
4	joy—happiness	same—opposite	4
5	find—lose	same—opposite	5
6	shrill—sharp	same—opposite	6
7	minus—plus	same—opposite	7
8	grim—stern	same—opposite	8
9	careless—anxious	same—opposite	9
10	crude—coarse	same—opposite	10
11	commend—approve	same—opposite	11
12	linger—loiter	same—opposite	12
13	agony—bliss	same—opposite	13
14	defective—normal	same—opposite	14
15	competent—qualified	same—opposite	15
16	knave—villain	same—opposite	16
17	null—void	same—opposite	17
18	wax—wane	same—opposite	18
19	adversary—colleague	same—opposite	19
20	altruistic—egotistic	same—opposite	20
21	furtive—sly	same—opposite	21
22	any—none	same—opposite	22
23	asunder—apart	same—opposite	23
24	deplete—exhaust	same—opposite	24
25	superfluous—essential	same—opposite	25
26	recoup—recover	same—opposite	26
27	celibate—married	same—opposite	27
28	recant—disavow	same—opposite	28
29	avarice—cupidity	same—opposite	29
30	aggrandize—belittle	same—opposite	30
31	decadence—decline	same—opposite	31
32	nullify—annul	same—opposite	32
33	ambiguous—equivocal	same—opposite	33
34	agglomerate—scatter	same—opposite	34
35	plenary—complete	same—opposite	35
36	suavity—asperity	same—opposite	36
37	perfunctory—meticulous	same—opposite	37
38	lugubrious—maudlin	same—opposite	38
39	desuetude—disuse	same—opposite	39
40	adventitious—accidental	same—opposite	40

Form 7

1	white—black	same—opposite	1
2	cry—laugh	same—opposite	2
3	flat—level	same—opposite	3
4	heaven—hell	same—opposite	4
5	accept—take	same—opposite	5
6	slim—slender	same—opposite	6
7	asleep—awake	same—opposite	7
8	comfort—console	same—opposite	8
9	pigmy—dwarf	same—opposite	9
10	beg—entreat	same—opposite	10
11	concede—deny	same—opposite	11
12	cautious—heedless	same—opposite	12
13	congregate—assemble	same—opposite	13
14	contradict—confirm	same—opposite	14
15	appeal—beseech	same—opposite	15
16	legible—readable	same—opposite	16
17	amiable—surly	same—opposite	17
18	cleave—split	same—opposite	18
19	convoke—dismiss	same—opposite	19
20	docile—refractory	same—opposite	20
21	dearth—scarcity	same—opposite	21
22	besmirch—cleanse	same—opposite	22
23	hoax—deception	same—opposite	23
24	colleague—adversary	same—opposite	24
25	irksome—refreshing	same—opposite	25
26	lucrative—profitable	same—opposite	26
27	momentous—immaterial	same—opposite	27
28	contingent—dependent	same—opposite	28
29	indict—arraign	same—opposite	29
30	prefix—append	same—opposite	30
31	essential—fundamental	same—opposite	31
32	ligature—band	same—opposite	32
33	myopia—hyperopia	same—opposite	33
34	motile—sessile	same—opposite	34
35	amenable—tractable	same—opposite	35
36	diatribe—invective	same—opposite	36
37	obdurate—stubborn	same—opposite	37
38	profligate—ascetic	same—opposite	38
39	preamble—peroration	same—opposite	39
40	pertinacious—obstinate	same—opposite	40

Form 8

1	no—yes	same—opposite	1
2	day—night	same—opposite	2
3	go—leave	same—opposite	3
4	begin—commence	same—opposite	4
5	bitter—sweet	same—opposite	5
6	assume—suppose	same—opposite	6
7	command—obey	same—opposite	7
8	tease—plague	same—opposite	8
9	diligent—industrious	same—opposite	9
10	corrupt—honest	same—opposite	10
11	toward—from	same—opposite	11
12	masculine—feminine	same—opposite	12
13	complex—simple	same—opposite	13
14	sacred—hallowed	same—opposite	14
15	often—seldom	same—opposite	15
16	ancient—modern	same—opposite	16
17	enormous—gigantic	same—opposite	17
18	confer—grant	same—opposite	18
19	acquire—lose	same—opposite	19
20	compute—calculate	same—opposite	20
21	defile—purify	same—opposite	21
22	apprehensive—fearful	same—opposite	22
23	sterile—fertile	same—opposite	23
24	chasm—abyss	same—opposite	24
25	sombre—gloomy	same—opposite	25
26	vestige—trace	same—opposite	26
27	validy—praise	same—opposite	27
28	finite—limited	same—opposite	28
29	contradict—corroborate	same—opposite	29
30	immune—susceptible	same—opposite	30
31	credit—debit	same—opposite	31
32	assiduous—diligent	same—opposite	32
33	transient—permanent	same—opposite	33
34	palliate—mitigate	same—opposite	34
35	execrate—revile	same—opposite	35
36	extinct—extant	same—opposite	36
37	pertinent—relevant	same—opposite	37
38	synchronous—simultaneous	same—opposite	38
39	superabous—disdainful	same—opposite	39
40	abstruse—recondite	same—opposite	40

Form 9

1	high—low	same—opposite	1
2	slow—fast	same—opposite	2
3	large—great	same—opposite	3
4	danger—safety	same—opposite	4
5	genuine—real	same—opposite	5
6	choose—select	same—opposite	6
7	fault—virtue	same—opposite	7
8	similar—different	same—opposite	8
9	jealousy—envy	same—opposite	9
10	sacred—profane	same—opposite	10
11	conquer—subdue	same—opposite	11
12	vanity—conceit	same—opposite	12
13	allure—attract	same—opposite	13
14	waste—conserve	same—opposite	14
15	deride—ridicule	same—opposite	15
16	censure—praise	same—opposite	16
17	illustrious—exalted	same—opposite	17
18	agitate—excite	same—opposite	18
19	haggard—gaunt	same—opposite	19
20	con—pro	same—opposite	20
21	eminent—distinguished	same—opposite	21
22	conspicuous—prominent	same—opposite	22
23	depressed—elated	same—opposite	23
24	orifice—aperture	same—opposite	24
25	erudite—scholarly	same—opposite	25
26	recline—stand	same—opposite	26
27	degenerate—deteriorate	same—opposite	27
28	martial—civil	same—opposite	28
29	nonchalance—anxiety	same—opposite	29
30	torpor—stupor	same—opposite	30
31	comprehensive—restricted	same—opposite	31
32	latent—hidden	same—opposite	32
33	node—knot	same—opposite	33
34	celestial—terrestrial	same—opposite	34
35	carnivorous—herbivorous	same—opposite	35
36	urbanity—civility	same—opposite	36
37	proclivity—inclination	same—opposite	37
38	putrid—fetid	same—opposite	38
39	impecunious—opulent	same—opposite	39
40	choleric—phlegmatic	same—opposite	40

Fig. 28.—Group Examination Alpha, Four Forms, Test 4, Synonym—Antonym.

EXAMINATION ALPHA

Test 5 Disarranged Sentences

Form 6

1	cows milk give	true	false	1
2	write are with to pencils	true	false	2
3	are and apples long thin	true	false	3
4	east the in rises sun the	true	false	4
5	months warmest are summer the	true	false	5
6	wood made carpets are of always	true	false	6
7	known elephant animal an is smallest the	true	false	7
8	water cork on float will not	true	false	8
9	vote children 21 cannot under	true	false	9
10	battleships on seldom sails used are	true	false	10
11	four hundred all pages contain books	true	false	11
12	iron paper made of is filings	true	false	12
13	pays cautious it be to often	true	false	13
14	a general not major a and rank same the of are	true	false	14
15	Washington canal 1776 Panama the in built	true	false	15
16	never deeds rewarded be should good	true	false	16
17	will live bird no forever	true	false	17
18	gases the in Mohawks fighting used poisonous	true	false	18
19	friends in us disaster often false desert	true	false	19
20	external deceptive never appearances are	true	false	20
21	use now of guns use are great in	true	false	21
22	happiness lists great casualty cause	true	false	22
23	always sleeplessness clear causes a conscience	true	false	23
24	inflict men pain needless cruel sometimes	true	false	24

Form 7

1	dogs meat eat	true	false	1
2	see are with to eyes	true	false	2
3	trees the fish in swim	true	false	3
4	harness paper of made is	true	false	4
5	money marry always for men	true	false	5
6	hump camel has a his a back on	true	false	6
7	flag the English same the as is the American	true	false	7
8	and cows from honey come bread	true	false	8
9	young nurse their cats	true	false	9
10	earth is mined coal the from	true	false	10
11	property floods life and destroy	true	false	11
12	grow and apples ground oranges the in	true	false	12
13	time in soldiers war trees in sleep	true	false	13
14	of Congress laws the makes our nation	true	false	14
15	true bought cannot friendship be	true	false	15
16	temperatures freezes water high at	true	false	16
17	judges just all be to ought	true	false	17
18	health necessary camp a is to clean	true	false	18
19	happiness source of always a crime is	true	false	19
20	bell most telephones have attached a	true	false	20
21	brings avarice man friends a	true	false	21
22	seen can the moon nights not be some	true	false	22
23	and emotions sorrow similar grief are	true	false	23
24	cardinal not cultivated vitrues the be should	true	false	24

Form 8

1	oranges yellow are	true	false	1
2	hear are with to ears	true	false	2
3	noise cannon never make a	true	false	3
4	trees in nests build birds	true	false	4
5	oil water not and will mix	true	false	5
6	bad are shots soldiers all	true	false	6
7	fuel wood are coal and for used	true	false	7
8	moon earth the only from feet twenty the is	true	false	8
9	to life water is necessary	true	false	9
10	are clothes all made cotton of	true	false	10
11	horses automobile an are than slower	true	false	11
12	tropics is in the produced rubber	true	false	12
13	leaves the trees in lose their fall	true	false	13
14	place pole is north comfortable a the	true	false	14
15	sand of made bread powder and is	true	false	15
16	sails is steamboat usually by propelled a	true	false	16
17	is the salty in water all lakes	true	false	17
18	usually judge can we actions man his by a	true	false	18
19	men misfortune have good never	true	false	19
20	tools valuable is for sharp making steel	true	false	20
21	due sometimes calamities are accident to	true	false	21
22	forget trifling friends grievances never	true	false	22
23	feeling is of painful exaltation the	true	false	23
24	begin a and avoid scornful words with the	true	false	24

Form 9

1	iron heavy is	true	false	1
2	chairs sit are to on	true	false	2
3	Alaska in cotton grows	true	false	3
4	happy is man sick always a	true	false	4
5	wood eat and good to are coal	true	false	5
6	Germany of Wilson king is England and	true	false	6
7	day it snow does every not	true	false	7
8	war in are useful aeroplanes	true	false	8
9	sounds people some loud annoy	true	false	9
10	thunders rains when it always it	true	false	10
11	food is tobacco as valuable a not	true	false	11
12	trees roses sea and in grow the	true	false	12
13	pole north equator mile one from is the the	true	false	13
14	a battle in racket very tennis useful is	true	false	14
15	made cloth wool cotton and is from	true	false	15
16	seldom forever good lasts luck	true	false	16
17	a ocean cross minutes few can boat the in a	true	false	17
18	seldom birds' diamonds nests are in found	true	false	18
19	love we wrong those us always who	true	false	19
20	to aid deep great snow a military manoeuvres is	true	false	20
21	never man the show the deeds	true	false	21
22	always is not a a stenographer bookkeeper	true	false	22
23	never who heedless those stumble are	true	false	23
24	people enemies arrogant many make	true	false	24

Fig. 29.—Group Examination Alpha, Four Forms, Test 5, Disarranged Sentences.

EXAMINATION ALPHA

Test 6 Number Series Completion.

Form 6

2	3	4	5	6	7	.8.	.9
5	10	15	20	25	30	35.	40.
10	9	8	7	6	5	.4..	.3..
6	9	12	15	18	21	24.	27.
8	8	6	6	4	4	.2..	.2..
3	7	11	15	19	23	27.	31..
9	1	7	1	5	1	.3..	..1..
25	25	21	21	17	17	13..	.13.
4	5	8	9	12	13	.16.	.17.
21	18	16	13	11	8	..6.	.3..
1	2	4	8	16	32	.64.	128
3	4	6	9	13	18	.24.	31.
12	14	13	15	14	16	.15.	.17.
25	24	22	21	19	18	.16.	.15.
16	12	15	11	14	10	.13.	..9..
16	8	4	2	1	½	1/4.	1/8.
15	16	14	17	13	18	.12	.19.
1	4	9	16	25	36	49.	64.
21	18	16	15	12	10	..9..	..6.
4	8	10	20	22	44	46.	92.

Form 7

2	3	4	5	6	7	.8.	..9.
10	9	8	7	6	5	.4..	..3.
5	10	15	20	25	30	35.	40
8	8	6	6	4	4	.2..	..2..
6	9	12	15	18	21	24.	27.
9	1	7	1	5	1	.3..	..1..
3	7	11	15	19	23	27.	31..
4	5	8	9	12	13	.16.	.17.
25	25	21	21	17	17	13..	.13.
1	2	4	8	16	32	64.	128
21	18	16	13	11	8	.6..	.3..
12	14	13	15	14	16	.15.	.17..
3	4	6	9	13	18	24.	31..
16	12	15	11	14	10	13.	.9..
25	24	22	21	19	18	.16.	.15..
16	8	4	2	1	½	1/4..	1/8..
1	4	9	16	25	36	49	64
21	18	16	15	12	10	.9.	.6.
15	16	14	17	13	18	.12	.19
4	8	10	20	22	44	46.	92

Form 8

3	4	5	6	7	8	.9.	10
8	7	6	5	4	3	..2	..1..
10	15	20	25	30	35	40.	45.
9	9	7	7	5	5	.3.	.3..
3	6	9	12	15	18	21.	24.
8	1	6	1	4	1	.2	1..
5	9	13	17	21	25	29	33.
8	9	12	13	16	17	20.	21..
27	27	23	23	19	19	.15.	15..
1	2	4	8	16	32	64	128
19	16	14	11	9	6	.4.	1..
11	13	12	14	13	15	14.	16.
2	3	5	8	12	17	23.	30..
18	14	17	13	16	12	.15.	11..
29	23	26	23	19	14	..8.	.1..
20	17	15	14	11	9	.8..	5
81	27	9	3	1	⅓	1/9.	1/27
1	4	9	16	25	36	49	64
16	17	15	18	14	19	13	20.
3	6	8	16	18	36	38	.76

Form 9

2	3	4	5	6	7	.8..	..9..
10	15	20	25	30	35	40.	45.
8	7	6	5	4	3	.2..	..1..
6	9	12	15	18	21	24.	27.
5	9	13	17	21	25	29.	33.
8	1	6	1	4	1	.2..	..1..
25	25	21	21	17	17	13.	13..
1	2	4	8	16	32	64.	128.
4	5	8	9	12	13	.16	.17.
8	8	6	6	4	4	.2..	.2..
19	16	14	11	9	6	4..	.1..
3	4	6	9	13	18	24.	31..
12	14	13	15	14	16	.15.	17.
29	28	26	23	19	14	..8..	.1..
18	14	17	13	16	12	15.	.11..
16	8	4	2	1	½	1/4.	1/8.
15	16	14	17	13	18	12.	.19.
1	4	9	16	25	36	49.	64.
21	18	16	15	12	10	.9..	..6..
3	6	8	16	18	36	38.	76.

Fig. 30.—Group Examination Alpha, Four Forms, Test 6, Number Series Completion.

EXAMINATON ALPHA

Test 7 Analogies

Form 6

1 dog—bark : cow—chair may fire house . 1
2 foot—man : hoof—corn tree cow hoe . 2
3 dog—puppy : cat—kitten dog tiger horse . 3
4 wash—face : sweep—clean broom floor straw . 4
5 door—house : gate—swing hinges yard latch . 5

6 water—fish : air—spark man flame breathe . 6
7 white—black : good—time clothes mother bad . 7
8 lamb—man : lamb—sheep dog shepherd wool . 8
9 rod—lamp : lace—button shoe straw head . 9
10 camp—safe : battle—win dangerous field fight . 10

11 straw—hat : leather—shoe bark coat soft . 11
12 tea—tea : table—chair wood legs dishes . 12
13 left—right : west—south direction east north . 13
14 floor—ceiling : ground—earth sky hill grass . 14
15 cold—ice : heat—wet cold steam stars . 15

16 hat—head : thimble—sew cloth finger hand . 16
17 Monday—Tuesday : Friday—week Thursday day Saturday . 17
18 lead—bullet : gold—paper coin silver copper . 18
19 skin—body : bark—tree dog bite leaf . 19
20 cannon—large : rifle—ball small bore shoot . 20

21 cellar—attic : bottom—well tub top house . 21
22 man—arm : tree—shrub limb flower bark . 22
23 suitcase—clothing : purse—purchase money string stolen . 23
24 knitting—girls : carpentry—trade houses boys lumber . 24
25 arteries—body : railroads—country train crossing accident . 25

26 ocean—pond : deep—sea well shallow steep . 26
27 revolver—man : sling—gun hurt bee hand . 27
28 engineer—chauffeur : locomotive—iron stack engine auto . 28
29 farmer—dog : Jersey—City cow horse State . 29
30 airplane—air : submarine—drive engine ship water . 30

31 esteem—friends : despise—forsake detest enemies people . 31
32 hospital—patient : prison—cell criminal bar jail . 32
33 tears—laughter : sorrow—joy distress funeral sad . 33
34 yes—no : affirmative—win debate deny negative . 34
35 establish—abolish : begin—work year end commence . 35

36 enemy—friends : peace—part treaty war enemy . 36
37 education—ignorance : wealth—poverty riches health comfort . 37
38 10—100 : 100—money 10000 20000 wealth . 38
39 imitate—copy : invent—study Edison machine originate . 39
40 historian—facts : novelist—fiction Dickens writer book . 40

Form 7

1 [illegible] : cow—dog . 1
2 [illegible] : water—tree lead stones . 2
3 father—son : mother—aunt nephew daughter sister . 3
4 [illegible] : [illegible]—pen cat speech dog . 4
5 engineer—locomotive : chauffeur—drive auto horse wagon . 5

6 [illegible] : lover—mother need enemy . 6
7 wrist—bracelet : neck—collar leg foot giraffe . 7
8 [illegible] : [illegible]—gun private army fight . 8
9 carpenter—house : shoemaker—hammer wax shoe leather . 9
10 shoemaker—shoe : button—coat catch hell hook . 10

11 quinine—bitter : sugar—cane sweet salt beets . 11
12 tiger—wild : cat—dog mouse tame pig . 12
13 [illegible] : wheel—spokes carriage tire . 13
14 north—south : east—north west south east . 14
15 feather—float : rock—ages hill sink break . 15

16 grass—cattle : bread—map butter water bones . 16
17 fish—fish : wing—feather air bird sail . 17
18 paper—wall : carpet—tack grass sweep floor . 18
19 food—man : fuel—engine burn coal wood . 19
20 sled—runner : buggy—horse carriage harness wheel . 20

21 poison—death : food—eat bird life bad . 21
22 Japanese—Japan : Chinese—Russia China Japanese pigtail . 22
23 angels—heaven : men—earth women boys Paradise . 23
24 Washington—Adams : first—contrast best second last . 24
25 prince—princess : king—palace queen president kingdom . 25

26 able—unable : strong—weak able big or . 26
27 add—subtract : multiply—add divide arithmetic increase . 27
28 past—present : yesterday—today tomorrow Christmas gone . 28
29 birth—death : planting—corn spring harvest wheat . 29
30 horse—mule : obedient—disgraceful donkey stubborn obey . 30

31 writer—books : bee—hive honey wasp sting . 31
32 light—dark : noise—report ring silence sound . 32
33 behind—late : before—after soon early dinner . 33
34 northern—southern : frigid—cool Canada cold torrid . 34
35 success—failure : pain—pleasure sadness work fun . 35

36 prosperity—happiness : adversity—success sorrow fun rage . 36
37 character—important : complexion—trivial blonde brunette good . 37
38 imitate—invent : copy—write pencil originate draw . 38
39 advice—command : persuasion—help aid urging compulsion . 39
40 Wednesday—week : July—August month hot year . 40

Form 8

1 shoe—foot : hat—kitten head knife penny . 1
2 pen—dog : lamb—red door three book . 2
3 spring—summer : autumn—winter warm harvest rise . 3
4 [illegible] : good—bad—mean disbelieve defamed good . 4
5 finger—hand : toe—body foot skin nail . 5

6 [illegible] : eat swim bird nest . 6
7 [illegible] : sweet stink odor note . 7
8 [illegible] : drive pony bark harness . 8
9 [illegible] : wolf bark bite snap . 9
10 [illegible] : tail big snake short . 10

11 [illegible] : jungle—small beard ugly . 11
12 [illegible] : January—February day month Christmas . 12
13 [illegible] : diving floating hole summer . 13
14 [illegible] : dark—hair brilliant blonde . 14
15 [illegible] : malice saint enemy dislike . 15

16 [illegible] : grow plant crack germinate . 16
17 [illegible] : run break spade bullet . 17
18 [illegible] : opposite need mother enemy . 18
19 [illegible] : western cottage farm city . 19
20 [illegible] : bath breeze destroy West . 20

21 [illegible] : president second last Bryan . 21
22 [illegible] : men small women obey . 22
23 [illegible] : common silver are steel . 23
24 [illegible] : know thank knowledge yes negative . 24
25 [illegible] : night week hour month . 25

26 [illegible] : key floor room door . 26
27 [illegible] : horse comb beard hat . 27
28 [illegible] : destroy table hard . 28
29 [illegible] : rule speed bicycle car . 29
30 [illegible] : read books paper chairs . 30

31 [illegible] : Mongolian—Chinese Indian negro yellow . 31
32 [illegible] : United States part hair China Ohio white . 32
33 [illegible] : Quakers enemies [illegible] men . 33
34 [illegible] : come house lower late . 34
35 [illegible] : buy costly bargain nasty . 35

36 [illegible] : loud rain lightning kill . 36
37 [illegible] : God everlasting pain traitor . 37
38 [illegible] : hear disturbing sound report . 38
39 [illegible] : sculptor liberty Pulitzer state . 39
40 [illegible] : health—sickness disease exhausting doctor . 40

Form 9

1 finger—hand : toe—box foot doll coat . 1
2 [illegible] : sweep—book tree bed see . 2
3 [illegible] : trousers—boy hat vest coat . 3
4 December—Christmas : November—month Thanksgiving December early . 4
5 above—up : below—above bottom sea hang . 5

6 [illegible] : knife plate cup meat . 6
7 [illegible] : man—speech woman boy work . 7
8 corn—[illegible] : bread—dairy flour man butter . 8
9 sweet—sugar : sour—sweet bread man vinegar . 9
10 dove—bird : angel—Gabriel good false heaven . 10

11 [illegible] : Washington—Spain Ohio . 11
12 [illegible] : bullet gun army [illegible] . 12
13 [illegible] : harness [illegible] passenger man . 13
14 [illegible] : fur kitten dog [illegible] . 14
15 [illegible] : regiment . 15

16 [illegible] : fish net hold wet . 16
17 [illegible] : steam cream frost refrigerator . 17
18 [illegible] : brother sister [illegible] cousin . 18
19 [illegible] : bones skin grave body . 19
20 [illegible] : bath deadly winter spring . 20

21 [illegible] : flowers pitcher table pottery . 21
22 [illegible] : heavy electricity dark girl . 22
23 [illegible] : costly plentiful common gold . 23
24 [illegible] : agreeable disagreeable man face . 24
25 [illegible] : private navy army soldier . 25

26 [illegible] : lose friend God blame . 26
27 [illegible] : horse sting hair thick . 27
28 [illegible] : grief fight battle Europe . 28
29 [illegible] : letter . 29
30 [illegible] : moonlight sound sun window . 30

31 [illegible] : hard brittle money easy work . 31
32 [illegible] : hear accord violin discordant . 32
33 [illegible] : reveal live love falsehood . 33
34 [illegible] : woman kiss steel long . 34
35 [illegible] : line round square sphere . 35

36 [illegible] : plot write think brain . 36
37 [illegible] : cold weather temperature mercury . 37
38 fear—[illegible] : vain memory express resist . 38
39 hop—[illegible] : grave repair death depression . 39
40 dismal—dark : cheerful—laugh bright house gloomy . 40

Fig. 31.—Group Examination Alpha, Four Forms, Test 7, Analogies.

EXAMINATION ALPHA
Test 8 Information.

Form 6

1 Boston is in Connecticut Rhode Island Maine Massachusetts 1
2 Euchre is played with dice rackets cards pins 2
3 The Arabian is a kind of horse goat cow sheep 3
4 The most prominent industry of Milwaukee is fish brewing flour automobiles 4
5 Turquoise is usually yellow red green blue 5
6 The Leghorn is a kind of cow horse fowl granite 6
7 Arthur Brisbane is famous as a newspaper map comic artist athlete actor 7
8 Shoes are made by Swift & Co. Smith & Wesson W. L. Douglas Babbitt Co. 8
9 Blanche Sweet is known as a writer singer suffragist movie actress 9
10 "The makings of a nation" is an advertisement of a tobacco flour beer health food 10
11 Country Gentleman is a kind of wheat corn hay oats 11
12 The artichoke is a vegetable fish lizard snake 12
13 Yale University is at New Haven Annapolis Ithaca Cambridge 13
14 Tokio is a city of India China Egypt Japan 14
15 Diamonds are obtained from mines reefs elephants oysters 15
16 Rodin is famous as a poet painter sculptor composer 16
17 The chameleon is a bird reptile insect fish 17
18 The thyroid is in the shoulder neck head abdomen 18
19 Dioxygen is a disinfectant food product patent medicine tooth paste 19
20 The U. S. S. Michigan is a destroyer monitor submarine battleship 20
21 The cutlass is a kind of sword musket cannon pistol 21
22 The Corona is a kind of phonograph multigraph adding machine typewriter 22
23 Indigo is a food drink color fabric 23
24 The xylophone is used in lithography music stenography book-binding 24
25 Madras is a drink fabric food dance 25
26 The author of "The Scarlet Letter" is Hawthorne Poe Stevenson Kipling 26
27 John Wesley was most famous in literature science war religion 27
28 The Delco System is used in plumbing filing ignition cataloguing 28
29 Rubber is obtained from ore petroleum trees hides 29
30 Darwin was most famous in literature science war politics 30
31 Falstaff appears in Romola Vanity Fair Oliver Twist Henry IV 31
32 The number of a Korean's legs is two four six eight 32
33 Perjury is a term used in pedagogy law theology medicine 33
34 A tedder is used in farming fishing hunting athletics 34
35 Slice is a term used in bowling golf tennis football 35
36 The Battle of Lexington was fought in 1620 1775 1812 1864 36
37 The Kilowatt is used in measuring rainfall wind power electricity water power 37
38 The Buick car is made in Toledo Flint Buffalo Detroit 38
39 Among the allies of Germany is Bulgaria Norway Rumania Portugal 39
40 An eight-sided figure is called a trapezium scholium parallelogram octagon 40

Form 7

1 Bull Durham is the name of a chewing gum aluminum ware tobacco clothing 1
2 Seven-up is played with rackets cards pins dice 2
3 The Merino is a kind of horse sheep goat cow 3
4 The most prominent industry of Minneapolis is flour packing automobiles brewing 4
5 Garnets are usually yellow blue green red 5
6 The Orpington is a kind of fowl horse granite cattle 6
7 George Ade is famous as a baseball player comic artist actor author 7
8 Soap is made by B. T. Babbitt Smith & Wesson W. L. Douglas Swift & Co. 8
9 Laura Jean Libby is known as a singer suffragist writer army nurse 9
10 "Eventually—why not now?" is an "ad" for a revolver cleanser flour automobile 10
11 Alfalfa is a kind of hay corn fruit rice 11
12 The rutabaga is a lizard vegetable fish snake 12
13 Harvard University is in Annapolis Cambridge Ithaca New Haven 13
14 Calcutta is a city in Egypt China India Japan 14
15 Pearls are obtained from mines elephants reefs oysters 15
16 MacDowell is famous as a composer sculptor poet painter 16
17 The penguin is a bird fish reptile insect 17
18 The larynx is in the head neck abdomen shoulder 18
19 Peruna is a disinfectant food product patent medicine tooth paste 19
20 The U. S. S. Nebraska is a destroyer monitor submarine battleship 20
21 The howitzer is a kind of musket sword cannon pistol 21
22 The Burroughs is a kind of multigraph adding machine phonograph typewriter 22
23 Cerise is a color drink fabric food 23
24 The cymbal is used in music stenography book-binding lithography 24
25 Ponges is a food dance fabric drink 25
26 The author of "Barrack Room Ballads" is Poe Stevenson Hawthorne Kipling 26
27 Joseph Choate was a merchant engineer lawyer scientist 27
28 An air-cooled engine is used in the Buick Packard Franklin Ford 28
29 Henry VIII's wives numbered 4 5 6 7 8 9 29
30 Newton was most famous in science politics literature war 30
31 Portia is in Vanity Fair Romola The Christmas Carol The Merchant of Venice 31
32 The number of a Hottentot's legs is two four six eight 32
33 Homicide is a term used in medicine law theology pedagogy 33
34 A dibble is used in fishing hunting athletics farming 34
35 Lob is a term used in football hockey golf tennis 35
36 The Spanish-American War started in 1890 1898 1904 1914 36
37 The ohm is used in measuring rainfall wind power electricity water power 37
38 The Rolls-Royce car is made in England France Canada United States 38
39 Bile is made in the spleen kidneys stomach liver 39
40 A five-sided figure is called a scholium pentagon parallelogram trapezium 40

Form 8

1 The apple grows on a shrub vine bush tree 1
2 Five hundred is played with rackets pins cards dice 2
3 The Percheron is a kind of goat horse cow sheep 3
4 The most prominent industry of Gloucester is fishing packing brewing automobiles 4
5 Sapphires are usually blue red green yellow 5
6 The Rhode Island Red is a kind of horse granite cattle fowl 6
7 Christie Mathewson is famous as a writer artist baseball player comedian 7
8 Revolvers are made by Swift & Co. Smith & Wesson W. L. Douglas B. T. Babbitt 8
9 Carrie Nation is known as a singer temperance agitator suffragist nurse 9
10 "There's a reason" is an "ad" for a drink revolver flour cleanser 10
11 Artichoke is a kind of hay corn vegetable fodder 11
12 Chard is a fish lizard vegetable snake 12
13 Cornell University is at Ithaca Cambridge Annapolis New Haven 13
14 Buenos Ayres is a city of Spain Brazil Portugal Argentina 14
15 Ivory is obtained from elephants mines oysters reefs 15
16 Alfred Noyes is famous as a painter poet musician sculptor 16
17 The armadillo is a kind of ornamental shrub animal musical instrument dagger 17
18 The tendon of Achilles is in the heel head shoulder abdomen 18
19 Crisco is a patent medicine disinfectant tooth-paste food product 19
20 An aspen is a machine fabric tree drink 20
21 The sabre is a kind of musket sword cannon pistol 21
22 The mimeograph is a kind of typewriter copying machine phonograph pencil 22
23 Maroon is a food fabric drink color 23
24 The clarionet is used in music stenography book-binding lithography 24
25 Denim is a dance food fabric drink 25
26 The author of "Huckleberry Finn" is Poe Mark Twain Stevenson Hawthorne 26
27 Faraday was most famous in literature war religion science 27
28 Air and gasolene are mixed in the accelerator carburetor gear case differential 28
29 The Brooklyn Nationals are called the Giants Orioles Superbas Indians 29
30 Pasteur is most famous in politics literature war science 30
31 Becky Sharp appears in Vanity Fair Romola The Christmas Carol Henry IV 31
32 The number of a Kaffir's legs is two four six eight 32
33 Habeas corpus is a term used in medicine law theology pedagogy 33
34 Ensilage is a term used in fishing athletics farming hunting 34
35 The forward pass is used in tennis hockey football golf 35
36 General Lee surrendered at Appomattox in 1812 1865 1886 1862 36
37 The watt is used in measuring wind power rainfall water power electricity 37
38 The Pierce Arrow car is made in Buffalo Detroit Toledo Flint 38
39 Napoleon defeated the Austrians at Friedland Wagram Waterloo Leipzig 39
40 An irregular four-sided figure is called a scholium triangle trapezium pentagon 40

Form 9

1 The pitcher has an important place in tennis football baseball handball 1
2 Cribbage is played with rackets mallets dice cards 2
3 The Holstein is a kind of cow horse sheep goat 3
4 The most prominent industry of Chicago is packing brewing automobiles flour 4
5 The topaz is usually red yellow blue green 5
6 The Plymouth Rock is a kind of horse cattle granite fowl 6
7 Irving Cobb is famous as a baseball player actor writer artist 7
8 Clothing is made by Smith & Wesson Kuppenheimer B. T. Babbitt Swift & Co. 8
9 Carrie Chapman Catt is known as a singer writer nurse suffragist 9
10 "The flavor lasts" is an "ad" for chewing gum drink health food fruit 10
11 Timothy is a kind of corn rye wheat hay 11
12 Kale is a fish lizard vegetable snake 12
13 The U. S. Naval Academy is at West Point Annapolis New Haven Ithaca 13
14 Rio Janeiro is a city of Spain Argentina Portugal Brazil 14
15 Emeralds are obtained from elephants mines oysters reefs 15
16 John Sargent is famous as a sculptor author painter poet 16
17 The iguana is a reptile bird fish insect 17
18 The clavicle is in the shoulder head abdomen neck 18
19 Karo is a patent medicine disinfectant tooth paste food product 19
20 Eucalyptus is a machine tree drink fabric 20
21 The carbine is a kind of pistol cannon musket sword 21
22 The multigraph is a kind of typewriter pencil copying machine phonograph 22
23 Magenta is a fabric drink food color 23
24 The piccolo is used in music stenography book-binding lithography 24
25 Cambric is a dance fabric food color 25
26 The author of "Treasure Island" is Poe Stevenson Kipling Hawthorne 26
27 Blackstone is most famous in law literature science religion 27
28 The spark plug belongs in the crank case manifold carburetor cylinder 28
29 The Bartlett is a kind of fruit fish fowl cattle 29
30 Kelvin was most famous in politics war science literature 30
31 Little Nell appears in Vanity Fair Romola The Old Curiosity Shop Henry IV 31
32 The number of a Papuan's legs is two four six eight 32
33 Arson is a term used in medicine law theology pedagogy 33
34 The silo is used in fishing farming hunting athletics 34
35 A puck is used in tennis football hockey golf 35
36 Dewey defeated the Spanish fleet in Newport News Boston Harbor China Sea Manila Bay 36
37 The volt is used in measuring electricity wind power rainfall water power 37
38 The Packard car is made in Detroit Buffalo Toledo Flint 38
39 The Cooper Hewitt lamp uses the vapor of gasolene mercury tungsten alcohol 39
40 A regular five-sided figure is scalene rhomboid equilateral elliptical 40

Fig. 32.—Group Examination Alpha, Four Forms, Test 8, Information.

SECTION 8.—*Examination beta, preliminary form.*

Fifteen tests were included in the preliminary form of examination beta. Six of these, tests 1, 3, 6, 9, 12, and 13, were used without change of blank in the final beta, form 0; for these see pages 251 and 258. In the following pages the other nine tests are arranged as follows:

Test 2. Form recognition.—Correct choice indicated by cross.

Test 5. Picture completion.—The following responses are correct:

1. Ear.	6. Spike.	11. Forearm.	16. Sight.
2. Stamp.	7. Hump.	12. Horn.	17. Shadow.
3. Spoon.	8. Barbs.	13. Heel.	18. Arm (in mirror).
4. Net.	9. Ball (in hand).	14. Nostril.	19. Steam.
5. Chimney.	10. Pail.	15. Ripples.	20. Handle.

Test 4. Dot imitation.—Shows traced pattern as it should be reproduced.

Test 7. Letter line.—Correct choice indicated by cross.

Test 8. Picture arrangement.—For item 12 credit was given also if picture 2 were placed third or fourth.

Test 11. Analogies.—Correct choice indicated by cross.

Test 14. Picture situation.—Correct responses indicated by cross.

Test 10. Spot pattern.—The pattern exposed is here reproduced as it should be completed. The unused blank shows no O's or X's.

Test 15. Memory for designs.—The designs exposed for reproduction are shown on page 199.

Test 2

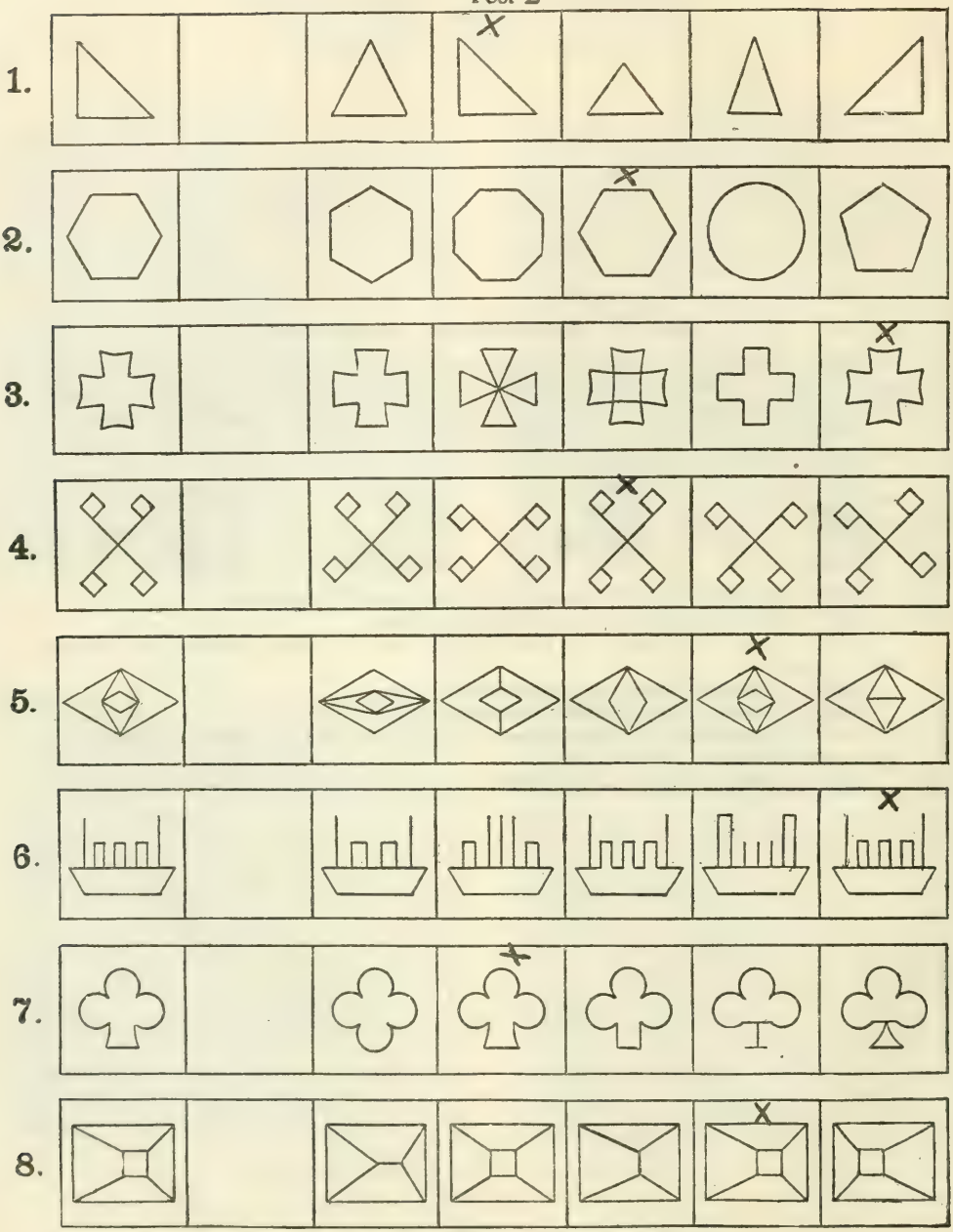


Fig. 33.—Group Examination Beta, Preliminary Form, Test 2, Form Recognition.

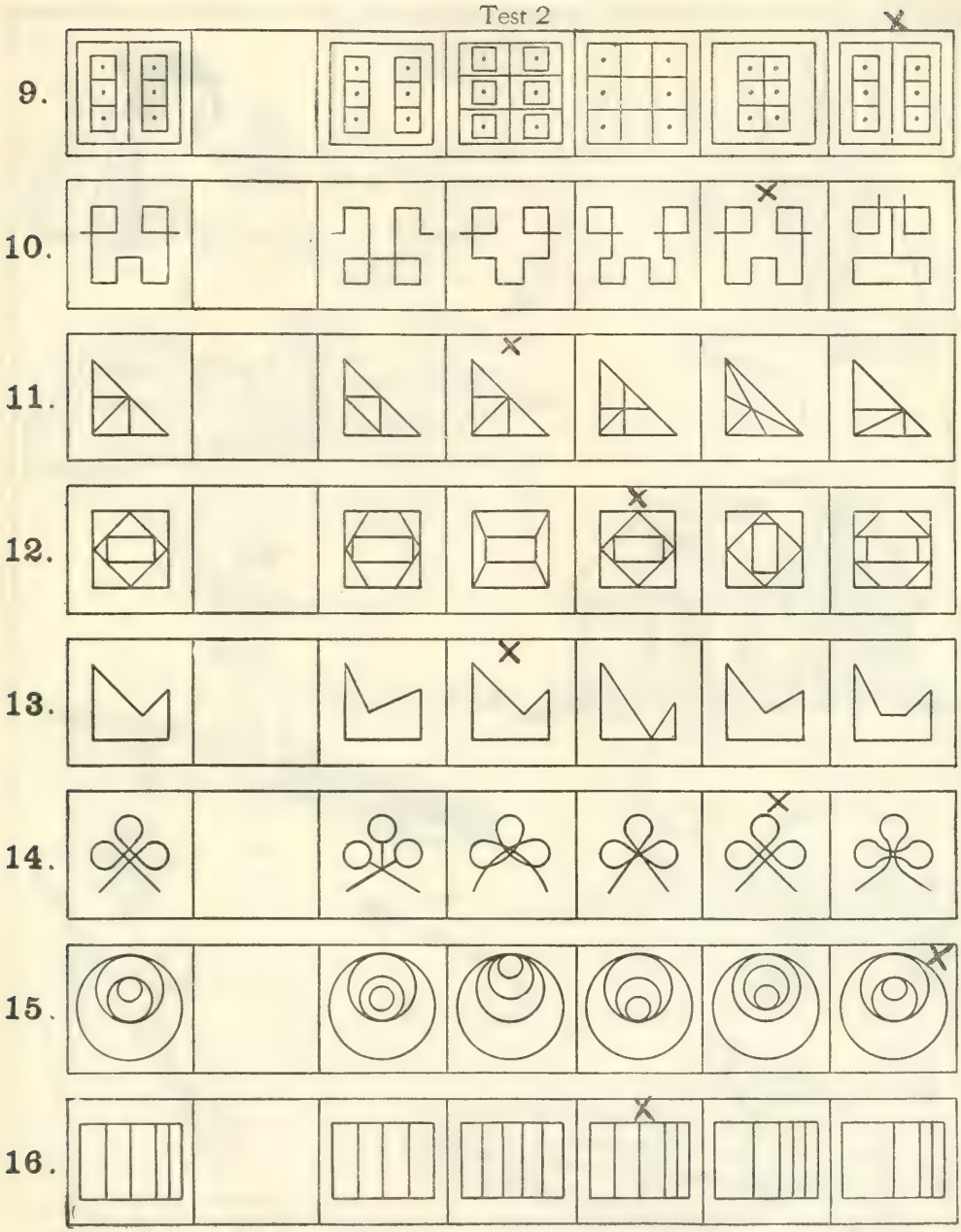


Fig. 34.—Group Examination Beta, Preliminary Form, Test 2, Form Recognition (continued).

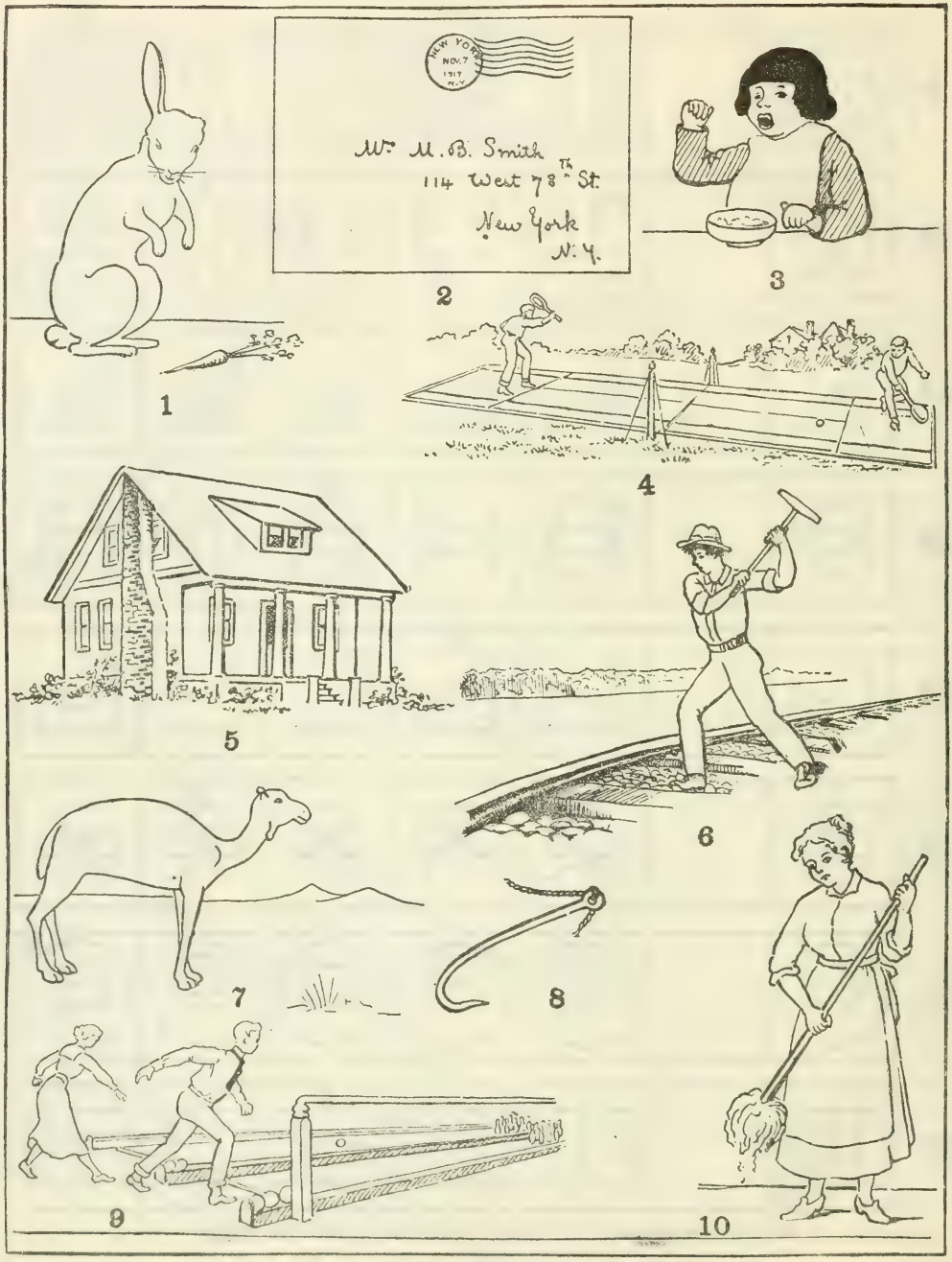


Fig. 35.—Group Examination Beta, Preliminary Form, Test 5, Picture Completion.

Test 5

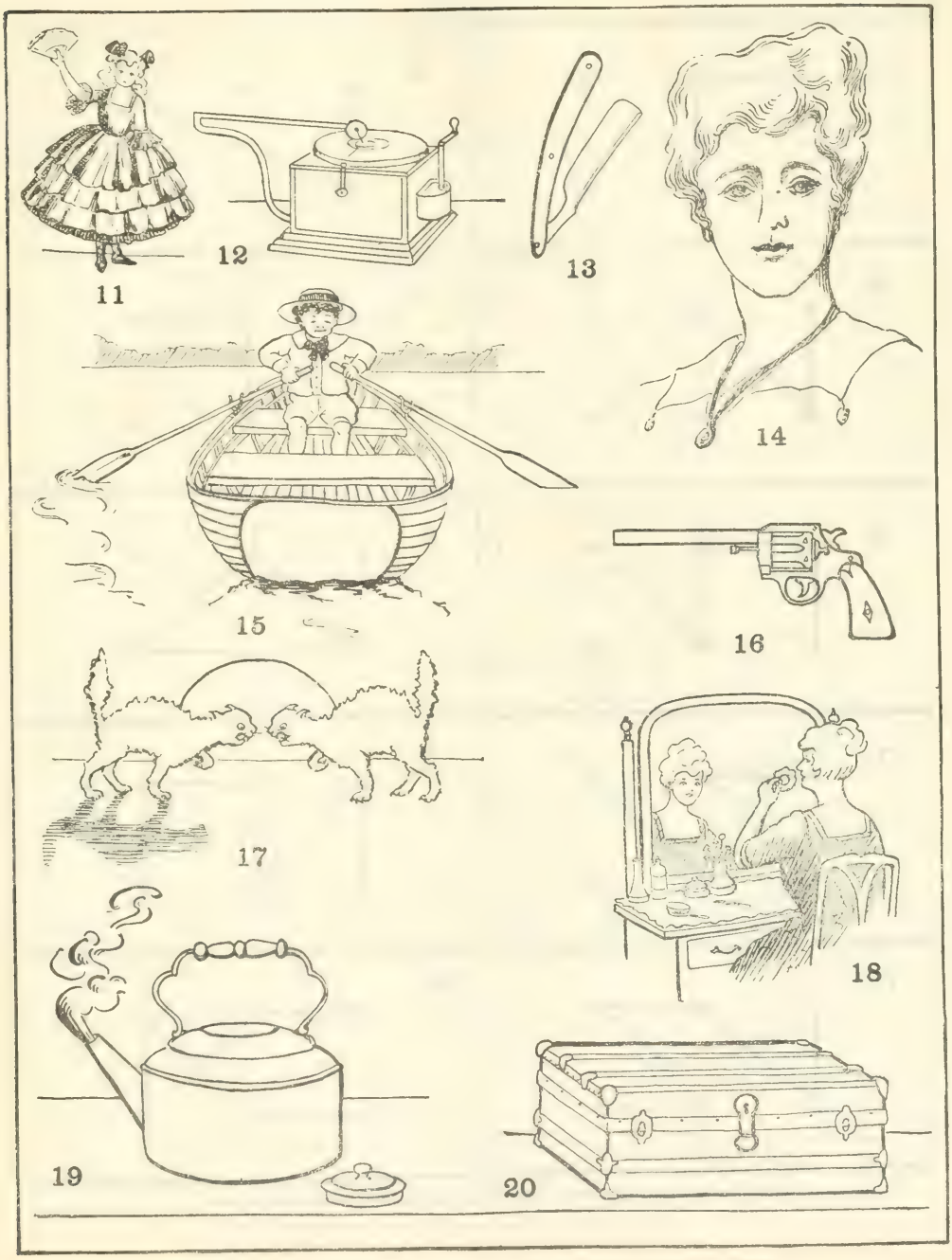


Fig. 36.—Group Examination Beta, Preliminary Form, Test 5, Picture Completion (continued).

Test 4

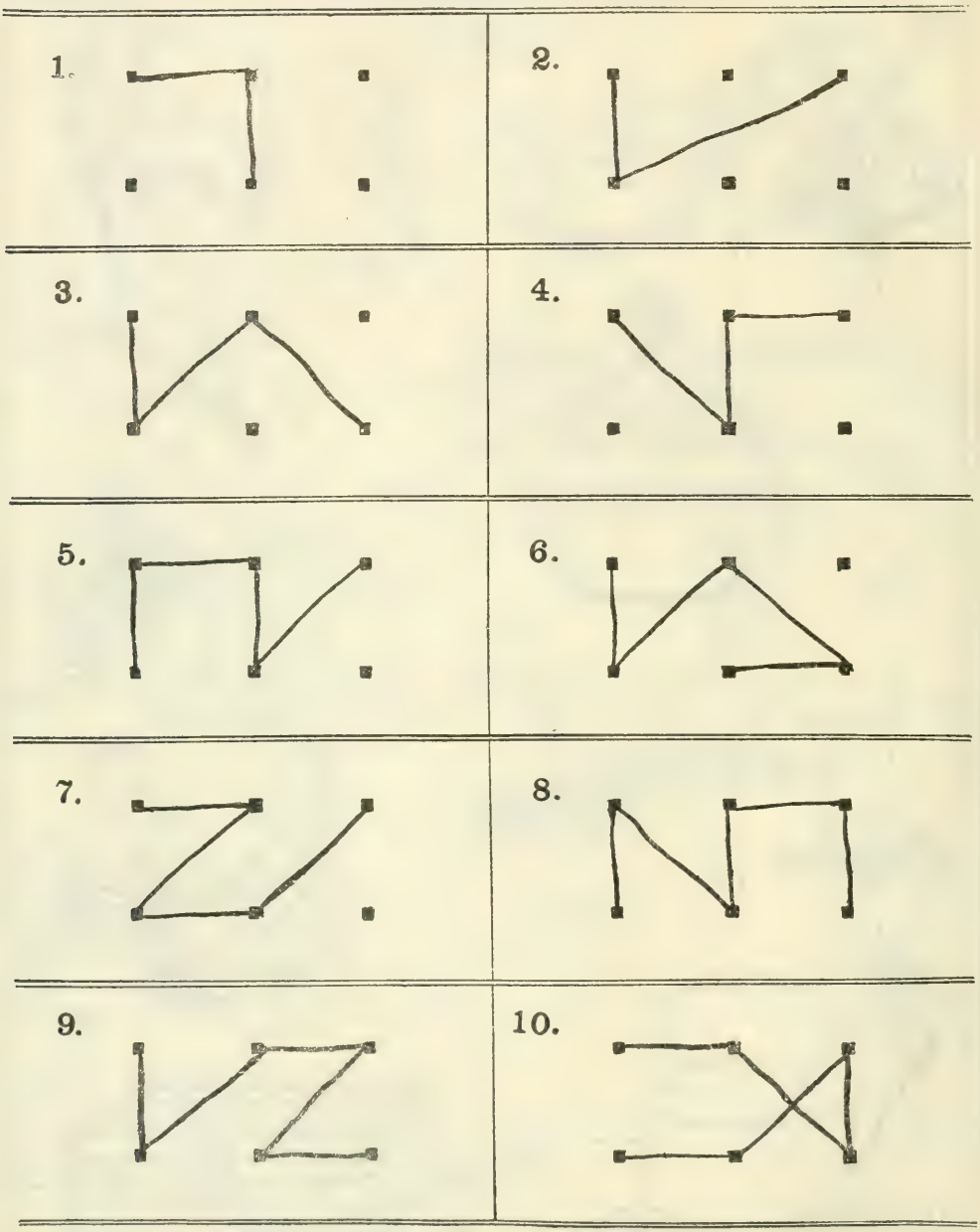


Fig. 37.—Group Examination Beta, Preliminary Form, Test 4. Dot Imitation.

Fig. 38.—Group Examination Beta, Preliminary Form, Test 7, Letter Line.

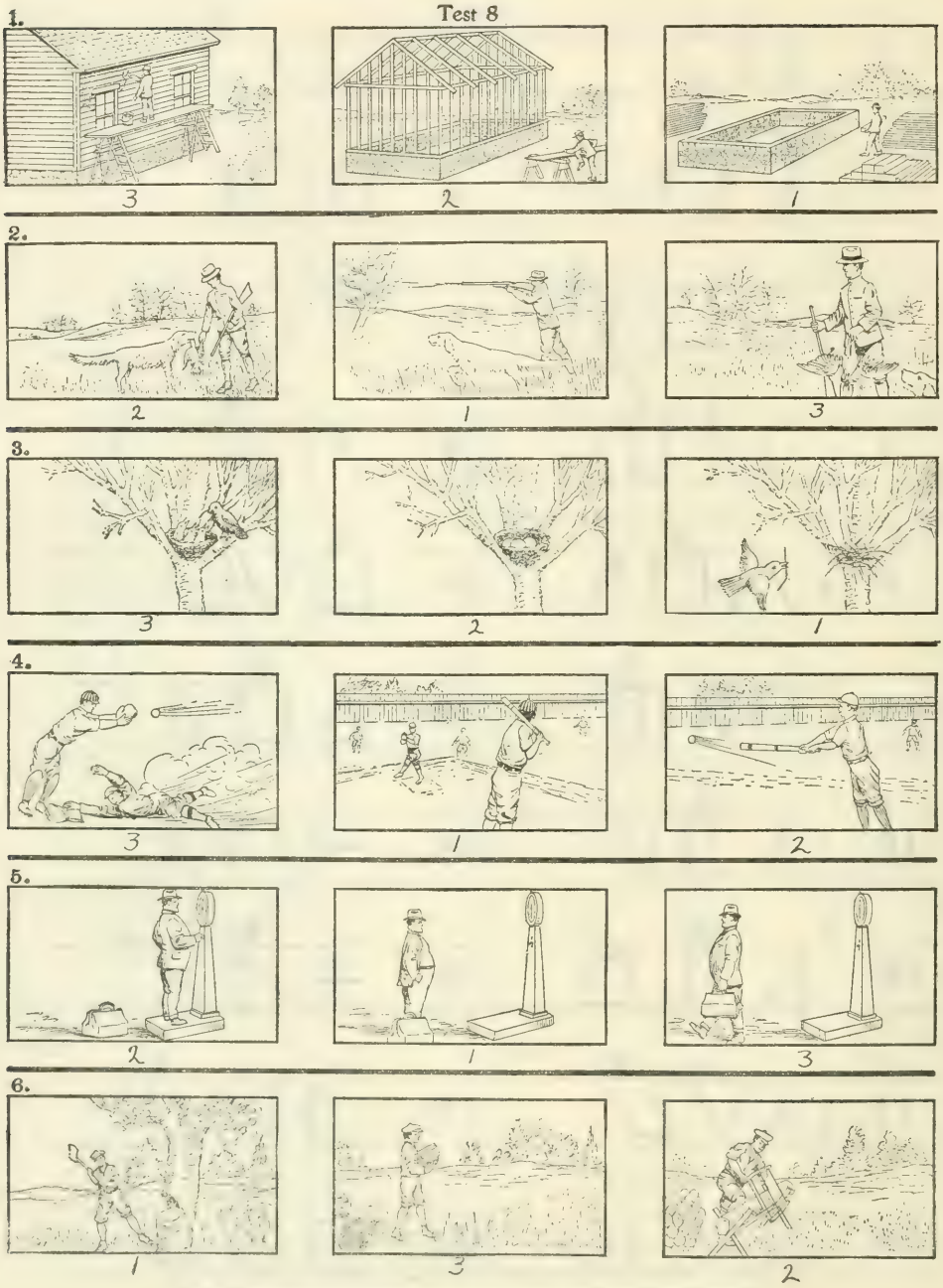


Fig. 39.—Group Examination Beta Preliminary Form, Test 8, Picture Arrangement.

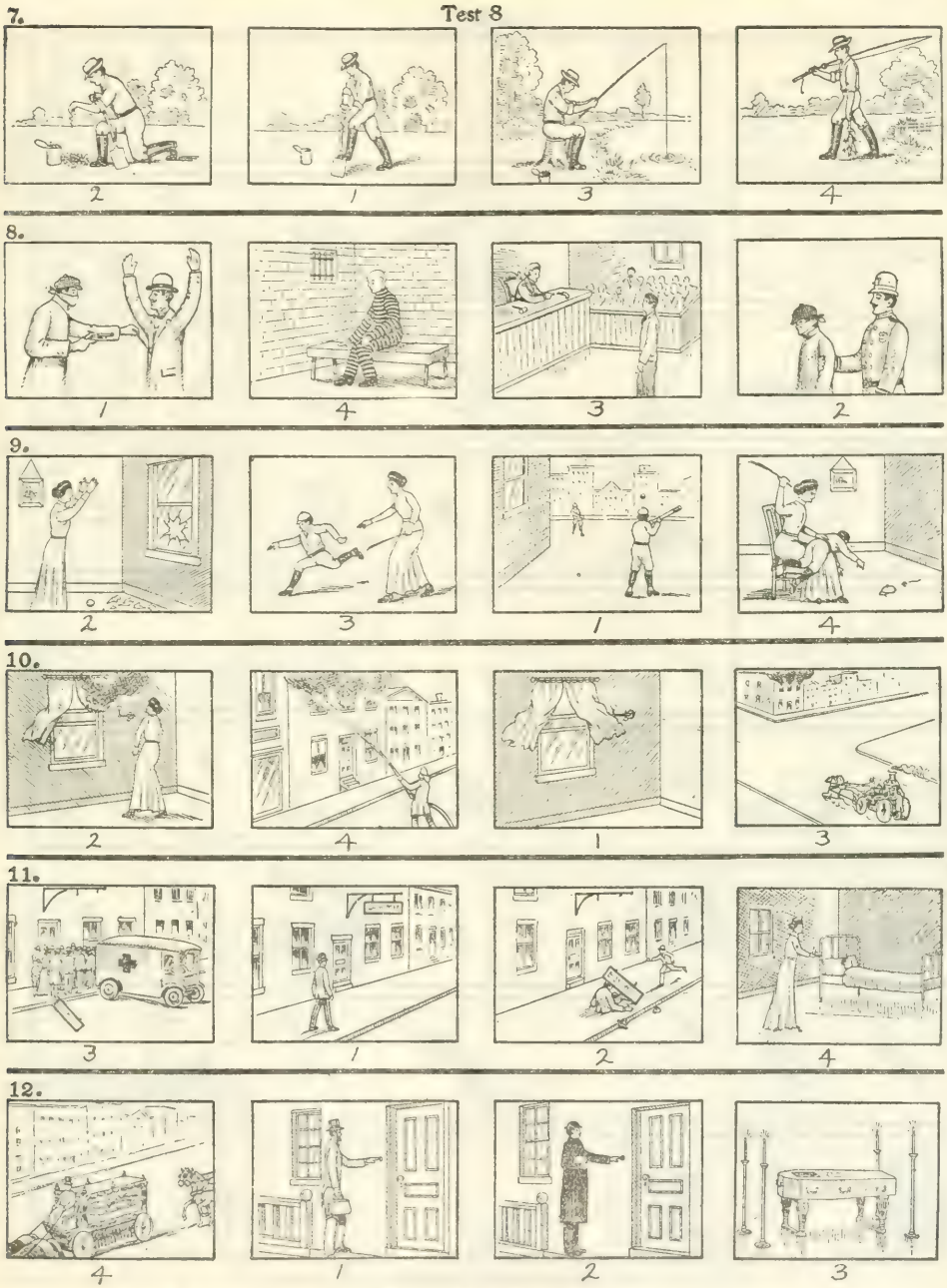


Fig. 40.—Group Examination Beta, Preliminary Form. Test 8. Picture Arrangement (continued).

Test 11

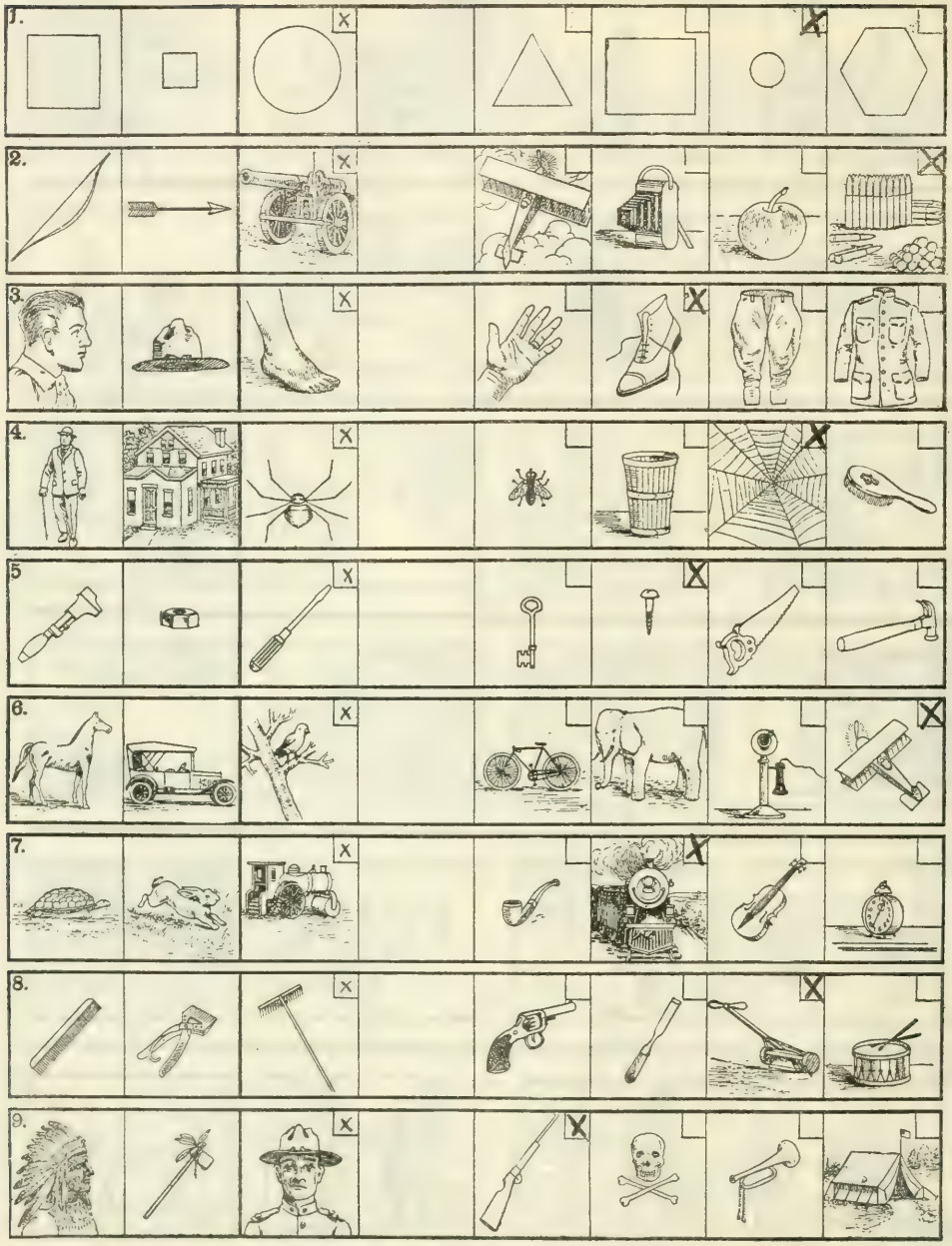


Fig. 41.—Group Examination Beta, Preliminary Form, Test 11, Analogies.

Test 11

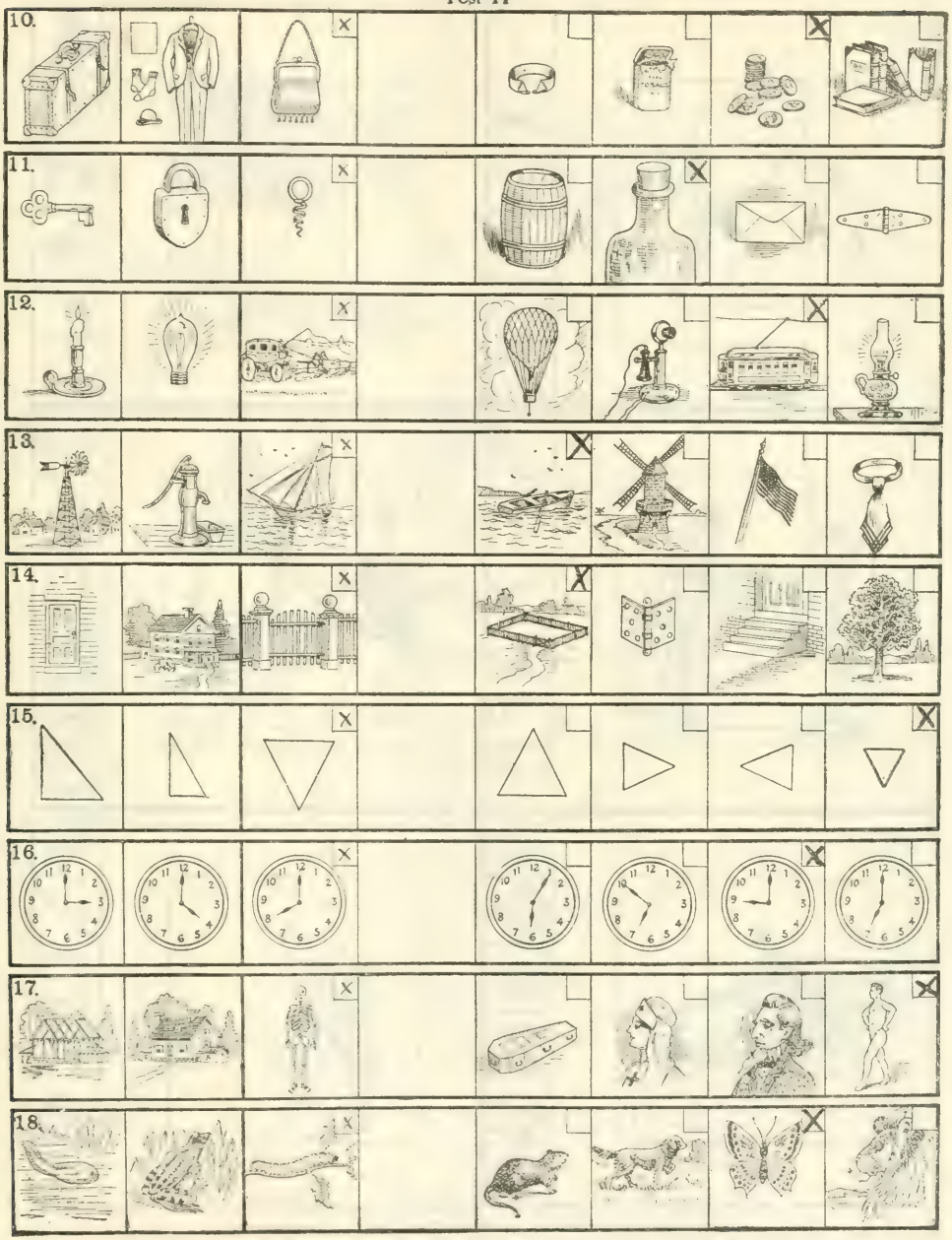


Fig. 42.—Group Examination Beta, Preliminary Form, Test 11, Analogies (continued).

Test 14

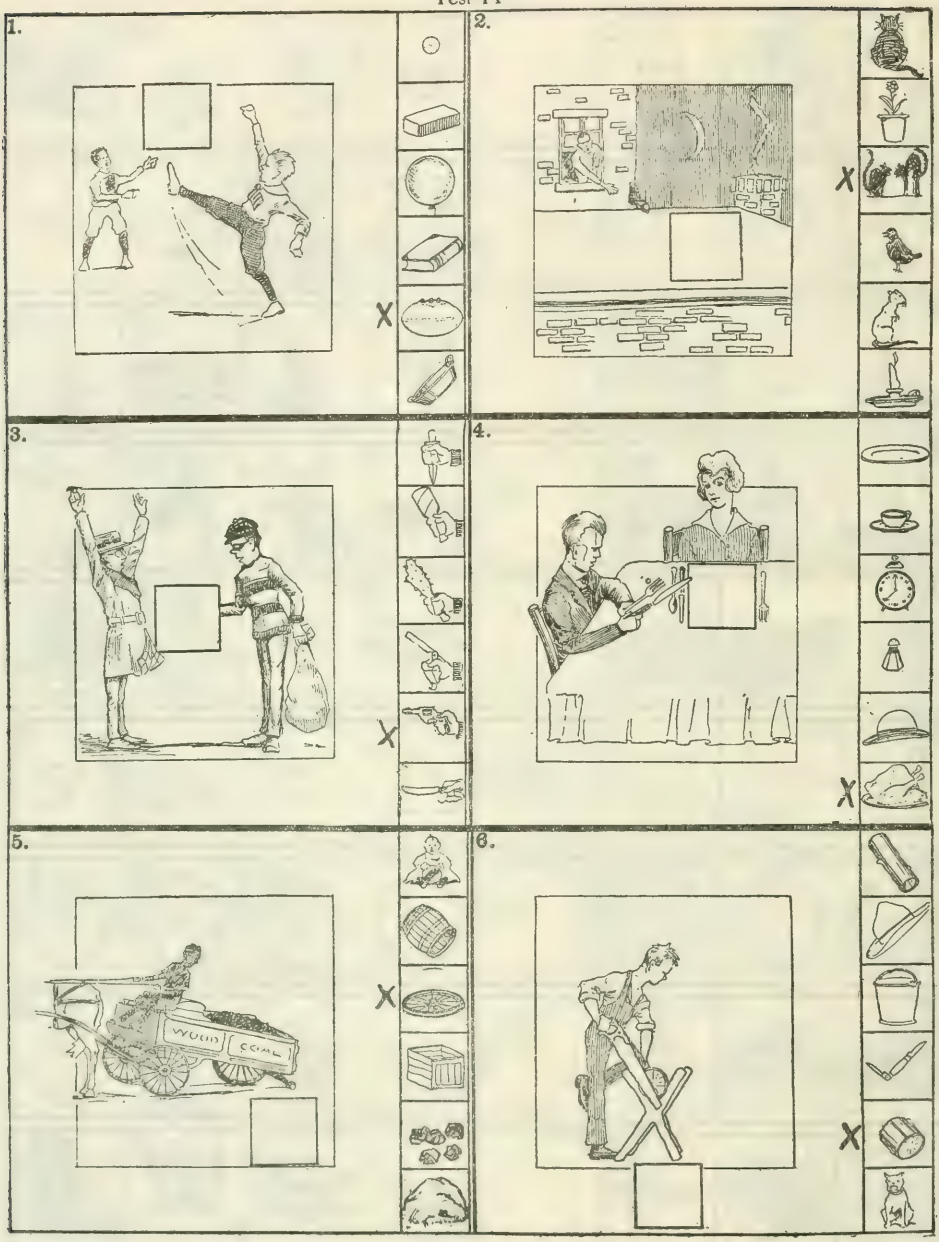


Fig. 43.—Group Examination Beta, Preliminary Form, Test 14, Picture Situation.

Test 14.

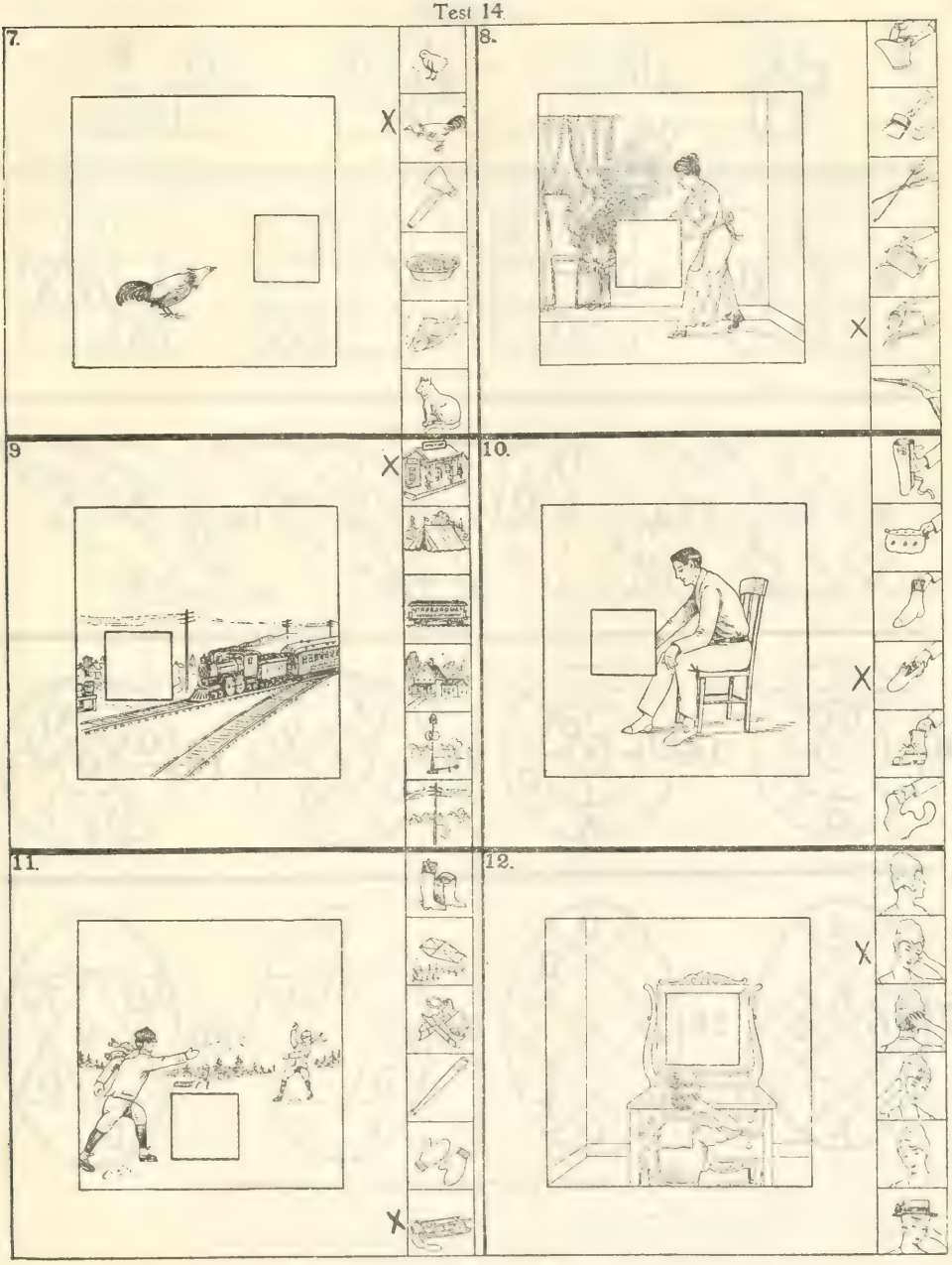


Fig. 44.—Group Examination Beta, Preliminary Form, Test 14, Picture Situation (continued).

Test 10

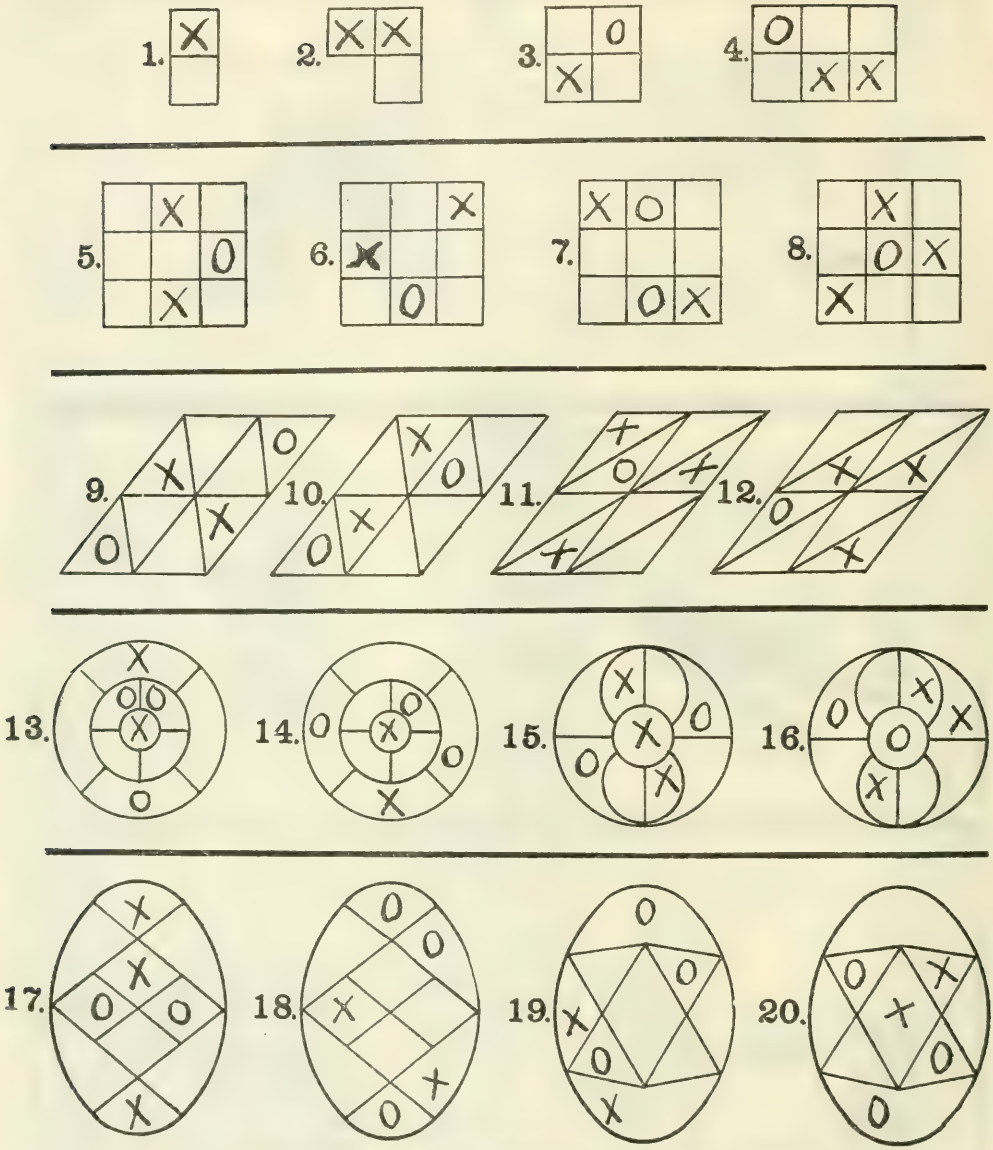


Fig. 45.—Group Examination Beta, Preliminary Form, Test 10, Spot Pattern.

PRELIMINARY FORM

Group Examination Beta

Group No. .....

Name ..... Rank ..... Age .....

Co. ..... Reg. ..... Arm. ..... Div. ..... Race .....

In what country born? ..... Years in U. S. ..... Schooling .....

Occupation ..... Weekly wages .....

Test 15

War Department, Office of the Surgeon General, Washington D.C.

Fig. 46.—Group Examination Beta, Preliminary Form, Test 15, Memory for Designs.

SECTION 9.—*Examination beta, form 0.*

The following eight pages present the tests of examination beta in the same order in which they appeared in the booklet, 8½ by 11 inches. Test 8 was eventually omitted in giving the examination. The blanks have been marked wherever feasible to indicate the correct response to each item. The blackboard demonstration which was used in connection with the instructions for each test is pictured in plates 7, 8, 15, and 16. For instructions see Examiner's Guide pages, 163 to 165.

Test 1. Maze.—Credit for correct tracing of each maze.

Test 2. Cube counting.—Correct response indicated.

Test 3. X–O series.—The series is to be carried out to the end of the line.

Test 4. Digit symbol.—The appropriate number is to be written under each symbol.

Test 5. Number checking.—Correct response indicated.

Test 6. Picture completion.—The following responses are correct:

1. Mouth.	6. Ear.	11. Trigger.	16. Net.
2. Eye.	7. Filament.	12. Tail.	17. Forearm.
3. Nose.	8. Stamp.	13. Leg.	18. Horn.
4. Spoon.	9. Strings.	14. Shadow.	19. Arm (in mirror).
5. Chimney.	10. Rivet.	15. Ball (in hand).	20. Diamond.

Test 7. Geometrical construction.—The correct responses are indicated below in Fig. 47.

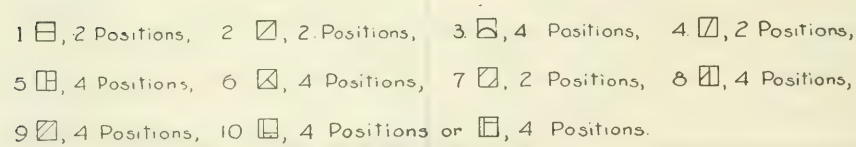


Fig. 47. See also Fig. 54, p. 257.

Test 8. Spot pattern.—Correct responses are not indicated.

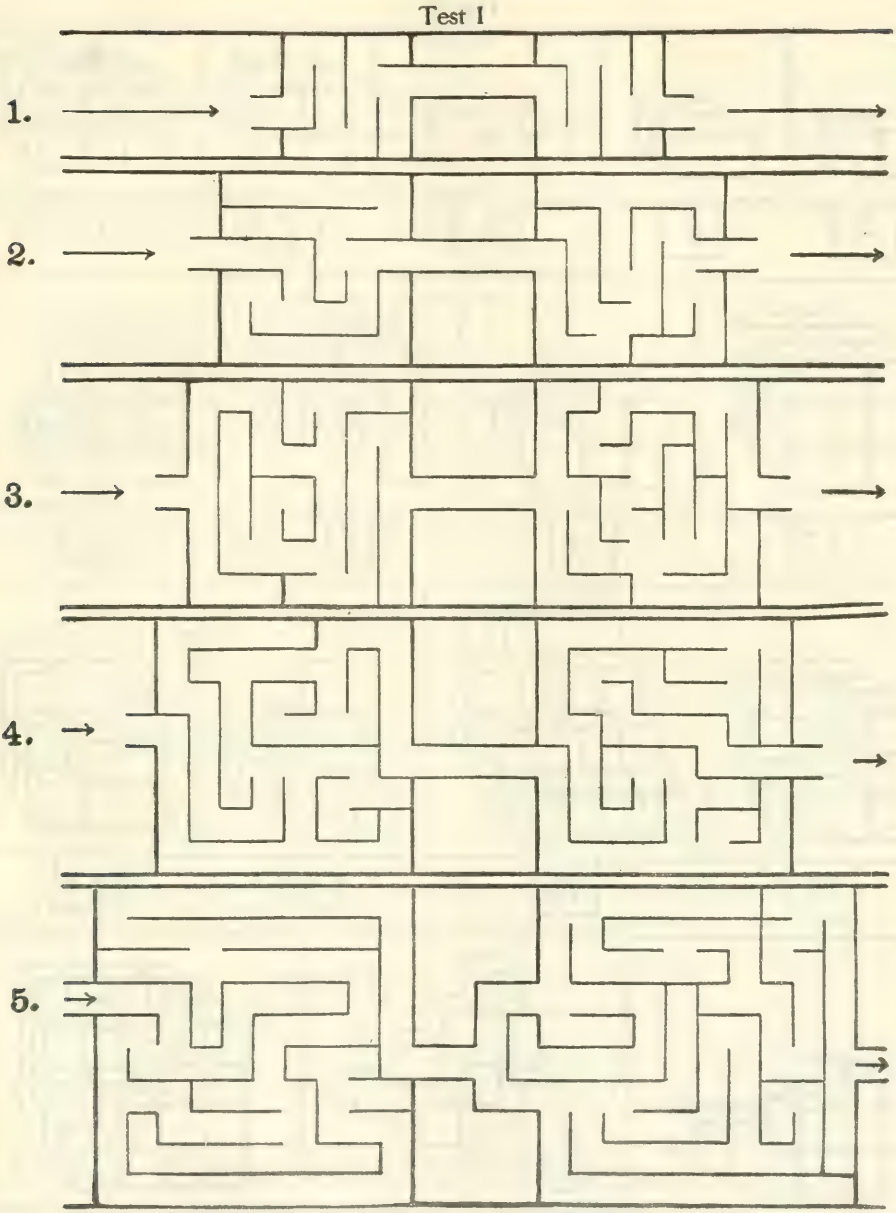


Fig. 48.—Group Examination Beta, Form 0, Test 1, Maze.

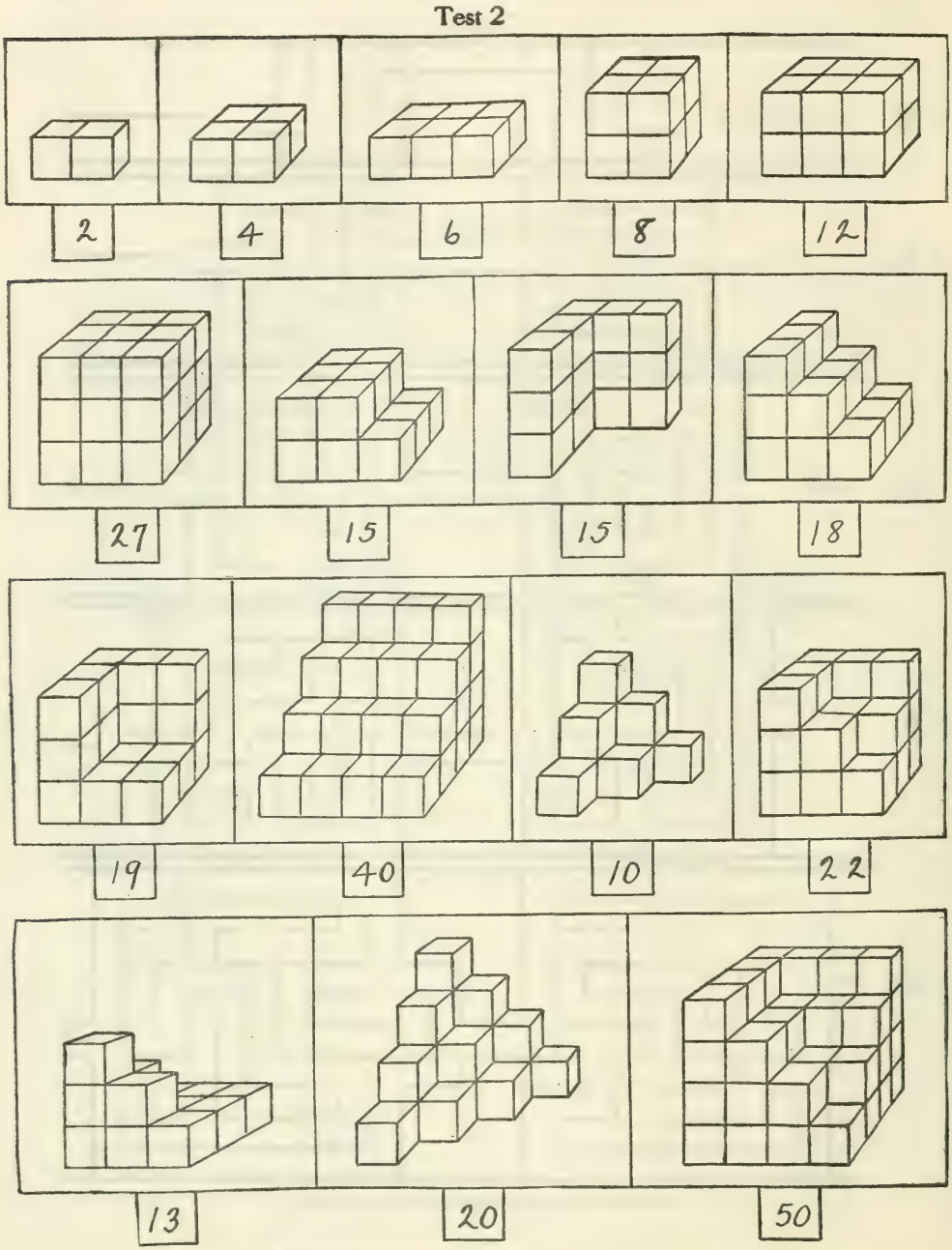


Fig. 49.—Group Examination Beta, Form 0, Test 2, Cube Analysis.

Test 3

1. X X X X X X X

2. X X X X X

3. X O X O X O X O X O

4. X X X X X X X

5. X O X O X O X O

6. X X O X X O X X O X X O

7. O O X X O O X X O O X X

8. X X O O O X X O O O X X O O O

9. X O X X O X X O X X O X

10. X X O X O X X O X O X X O X O

11. X O X X O X X X O X O X X O X X X O

12. X X X X O O O X X O X X X X O O O X X O

Fig. 50.—Group Examination Beta, Form 0, Test 3, X-O Series.

Test 4

1	2	3	4	5	6	7	8	9
—	И	⊐	L	U	O	∧	X	=

	3	1	2	1	3	2	1	4	2	3	5	2	9	1	4
1															

	6	3	1	5	4	2	7	6	3	8	7	2	9	5	4
2.															

	6	3	7	2	8	1	9	5	8	4	7	3	6	9	5
3.															

	1	9	2	8	3	7	4	6	5	9	4	8	5	7	6
4.															

	9	3	8	6	4	1	5	7	2	6	2	4	8	1	3
5.															

	4	9	5	1	7	5	2	6	9	3	7	8	4	1	8
6															

Fig. 51.—Group Examination Beta, Form 0, Test 4, Digit Symbol

Test 5

650	.....X.....	650	10243586	.....X....	10243586
041	.....	044	659012534	.....	659021354
2579	....X.....	2579	388172902	.....	381872902
3281	.....X.....	3281	631027594	.....X...	631027594
55190	.....	55102	2499901354	.....	2499901534
39190	.....X.....	39190	2261059310	.....	2261659310
658049	.....	650849	2911038227	.....X...	2911038227
3295017	.....	3290517	313377752	.....X...	313377752
63015991	.....	63019991	1012938567	.....X...	1012938567
39007106	.....X.....	39007106	7166220988	.....	7162220988
69931087	.....X.....	69931087	3177628449	.....	3177682449
251004818	.....	251004418	468672663	.....X...	468672663
299056013	.....X.....	299056013	9104529003	.....	9194529003
36015992	.....	360155992	3484657120	.....	3484657210
3910066482	.....	391006482	8588172556	.....	8581722556
8510273301	.....X....	8510273301	3120166671	.....X..	3120166671
263136996	.....X...	263136996	7611348879	.....	76111345879
451152903	.....X....	451152903	26557239164	.....X...	26557239164
3259016275	.....	3295016725	8819002341	.....X...	8819002341
582039144	.....X....	582039144	6571018034	.....X...	6571018034
61558529	.....	61588529	38779762514	.....	38779765214
211915883	.....	219915883	39008126557	.....	39008126657
670413822	.....	670143822	75658100398	.....X...	75658100398
17198591	.....X....	17198591	41181900726	.....X...	41181900726
36482991	.....X.....	36482991	6543920817	.....	6543920871

Fig. 52.—Group Examination Beta, Form 0, Test 5, Number Checking.

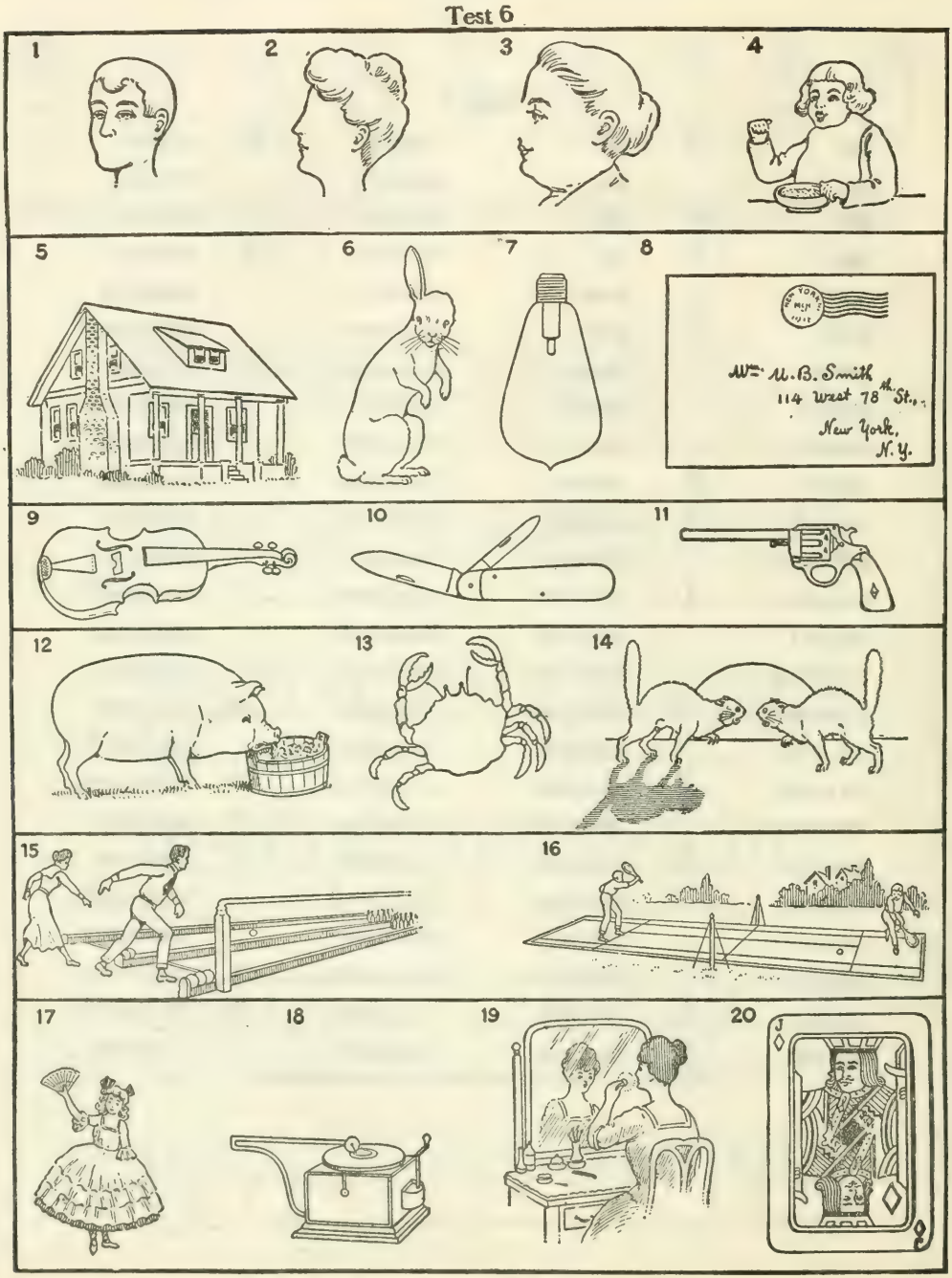


Fig. 53.—Group Examination Beta, Form 0, Test 6, Picture Completion.

Test 7

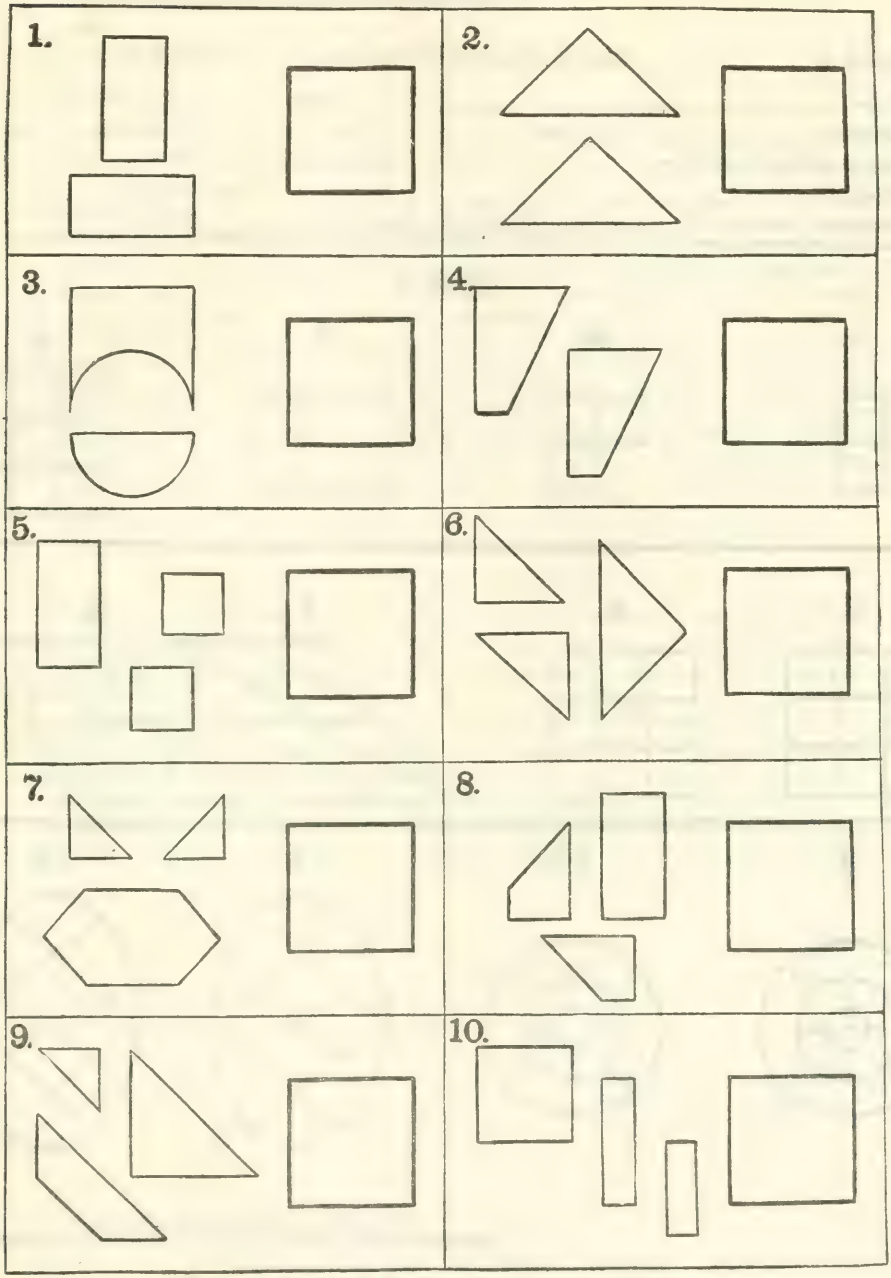


Fig. 54.—Group Examination Beta, Form 0, Test 7, Geometrical Construction.

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FORM O GROUP EXAMINATION BETA GROUP NO.....

Name..... Rank..... Age.....

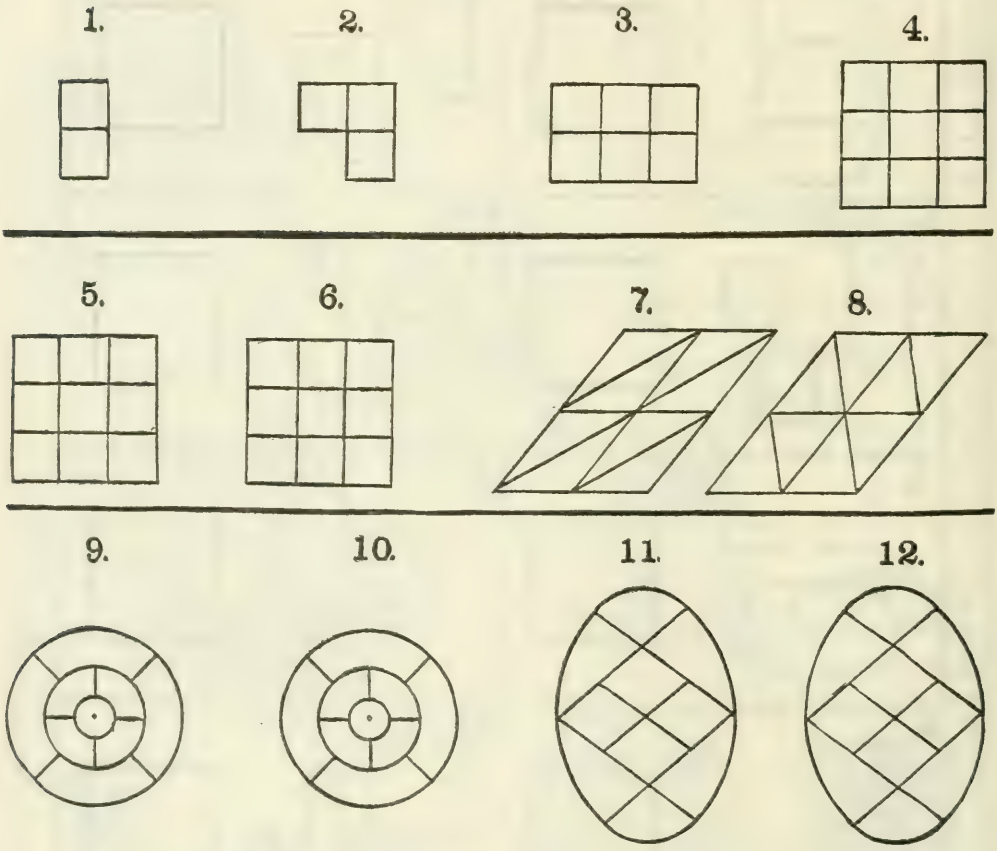
Company..... Regiment..... Arm..... Division.....

In what country or state born?..... Years in U. S.?..... Race.....

Occupation..... Weekly Wages.....

Schooling: Grades, 1, 2, 3, 4, 5, 6, 7, 8: High or Prep. School, Year 1, 2, 3, 4: College, Year 1, 2, 3, 4.

TEST 8



Division of Psychology, Medical Department, U. S. A.
Authorized by the Surgeon General, Feb. 8, 1918, Edition, July 10, 1918, 300,000

Fig. 55.—Group Examination Beta, Form O, Test 8, Spot Pattern.

SECTION 10.—*Stencils for scoring group examinations.*

Most of the group examination tests were scored by means of transparent celluloid stencils, each marked with india ink, so that when placed on the corresponding page of the booklet it gave the correct answers to the test. Actual answers in the booklet, if correct, match the stencil. For certain tests (alpha, test 2, arithmetic, for instance) it was more convenient to have the answers written on a strip of cardboard, which might be laid alongside the column of answers for comparison. These methods served three purposes: (1) They contributed to the speed in scoring, on which depended prompt report of results. (2) They eliminated the necessity for judgment by the scorer as to correctness of response; this made possible the use of men temporarily detailed for scoring during rush examining, without a long period of training. (3) It was obvious to all that results thus obtained gave an objective and impersonal measurement.

In plate 5B, p. 90, some of the celluloid stencils may be seen in the foreground.

SECTION 11.—*Individual examinations.*

The following blanks were used during the preliminary examining in the fall of 1917:

1. Individual examination (see Examiner's Guide, first revision, pp. 130 to 148).
2. Mazes, used in connection with test D, individual examination (see Examiner's Guide, first revision, p. 133).
3. Stenquist mechanical test (see Examiner's Guide, first revision, pp. 146 to 147).

The following individual examination blanks are those regularly used during the examination of recruits from April, 1918, to January, 1919:

1. Point Scale examination (see Examiner's Guide, second revision, pp. 168 to 171).
2. Stanford-Binet examination (see Examiner's Guide, second revision, pp. 172 to 182).
3. Performance Scale examination (see Examiner's Guide, second revision, pp. 182 to 194).

INDIVIDUAL EXAMINATION

SERIES..... GROUP EXAM. NO.....

EXAMINER.....

NAME..... AGE.....

COMPANY..... BATTALION..... REGIMENT..... DIVISION.....

PREVIOUS OCCUPATION..... WEEKLY WAGES.....

EDUCATION: GRADE REACHED..... HIGH OR PREP. SCHOOL..... COLLEGE.....

GROUP I (A TO G)

A CUBE CONSTRUCTION	MOVES	PLAN	TIME	SCORE
(a) Middle layer of three cubes				
(b) Upper layer of three cubes				WEIGHTED SCORE
(c) Two-inch cube (paint hidden)				
(d) Three-inch cube (paint hidden)				
(e) Three-inch cube (paint visible)				

Remarks ( ).....

B CLOCK TEST Series.....	RESPONSE	RIGHT	WRONG	TIME	SCORE
(a) Telling time by clock					
(b) Interchanging hands (clock visible)					WEIGHTED SCORE
(c) Ditto (clock not visible)					
(d) Ditto (clock not visible)					
(e) Ditto (clock not visible)					

Remarks ( ).....

C CUBE IMITATION (KNOX)	RESPONSE 1	RESPONSE 2	RIGHT	WRONG	SCORE
(a) 1–2–3–4					
(b) 1–2–3–4–3					
(c) 1–3–2–4					
(d) 2–3–4–1					
(e) 1–4–3–2–4					WEIGHTED SCORE
(f) 1–3–1–2–4					
(g) 1–3–2–4–1–3					
(h) 1–4–3–1–2–4					
(i) 1–4–2–3–4–1					
(j) 2–3–1–2–4–2					

Remarks ( ).....

D MAZE (PORTEUS)	ERRORS	TIME: ADJ.	TIME: TRAC.	TOTAL	SCORE
(a) Maze 10					
(b) Maze 11					WEIGHTED SCORE
(c) Maze 12					
(d) Maze 13					

Remarks ( ).....

E FORM BOARD (DEARBORN NO. 3)	MOVES	TIME	SCORE
(a) Problem A, 3 moves			
(b) Problem B, 5 moves			WEIGHTED SCORE
(c) Problem C, 8 moves			
(d) Problem D, 9 moves			

Remarks ( ).....

Fig. 56.—Individual Examination Blank (first page).

F CONSTRUCTION (STENQUIST) — SCORE

A.....B.....C.....D.....E.....F.....G.....H.....I.....J.....Total.....

Time: No. of minutes required.....Credit for time.....

Remarks ( ).....

WEIGHTED SCORE

G ORIENTATIONAL INFORMATION

	RIGHT	WRONG	SCORE
(a) Date of birth.....Nationality.....Birthplace.....			
(b) Day of week.....Month.....Day of Month.....Year.....			
(c) Present location.....			
(d) Naming days of week—forward.....backward.....			
(e) Naming months of year—forward.....backward.....			
(f) In what month is New Year?.....Christmas?.....			WEIGHTED SCORE
(g) How is leap year different?.....			
(h) Sun rises in.....Sets in.....			
(i) Facing north—direction to right.....			
(j) Seasons.....Days are longest?.....Shortest?.....			

Remarks ( ).....

H ASSOCIATION, UNCONTROLLED — SCORE

Median association time.....No. of reactions over 10 seconds.....

No. of predicate reactions.....Median frequency.....

Remarks ( ).....

WEIGHTED SCORE

I DIGITS BACKWARD Form.....

Practice Series: 581..... 946.....

	RESPONSE	RIGHT	WRONG	SCORE
Four figures, 1st Set.....				
Four figures, 2nd Set.....				
Five figures, 1st Set.....				
Five figures, 2nd Set.....				
Six figures, 1st Set.....				
Six figures, 2nd Set.....				WEIGHTED SCORE
Seven figures, 1st Set.....				
Seven figures, 2nd Set.....				
Eight figures, 1st Set.....				
Eight figures, 2nd Set.....				

Remarks ( ).....

J VOCABULARY Series..... — SCORE

1.....	11.....	21.....	31.....
2.....	12.....	22.....	32.....
3.....	13.....	23.....	33.....
4.....	14.....	24.....	34.....
5.....	15.....	25.....	35.....
6.....	16.....	26.....	36.....
7.....	17.....	27.....	37.....
8.....	18.....	28.....	38.....
9.....	19.....	29.....	39.....
10.....	20.....	30.....	40.....

Remarks ( ).....

WEIGHTED SCORE

Fig. 57.—Individual Examination Blank (second page).

GROUP II (K TO P, ALSO I AND J)

K LETTER LINE Series.....

	RESPONSE	RIGHT	WRONG	SCORE
(a) Five Letters				WEIGHTED SCORE
(b) Six Letters				
Remarks ( )				

L DISARRANGED SENTENCES Series.....

	RIGHT	WRONG	TIME	SCORE
(a)				WEIGHTED SCORE
(b)				
(c)				
Remarks ( )				

M ABSURDITIES Series.....

	RIGHT	SCORE
(a).....(b).....(c).....(d).....(e).....(f).....(g).....(h).....(i).....(j).....		WEIGHTED SCORE
Remarks ( )		

N CONTROLLED ASSOCIATION (RIMES) Series.....

	RIGHT	WRONG	SCORE
(a)			WEIGHTED SCORE
(b)			
(c)			
Remarks ( )			

GIVE AT THIS POINT TEST I, DIGITS BACKWARD.

O LIKENESSES AND DIFFERENCES Series.....

SCORE (No. Right)

(a)..... (f).....
(b)..... (g).....
(c)..... (h).....
(d)..... (i).....
(e)..... (j).....

WEIGHTED SCORE

Remarks ( ).....

P INGENUITY Series.....

	RIGHT	WRONG	TIME	SCORE
(a)				WEIGHTED SCORE
(b)				
(c)				
Remarks ( )				

GIVE AT THIS POINT TEST J, VOCABULARY.

GROUP III (Q TO V, ALSO I AND J)

SCORE

Q DESIGNS Scores: 0, ½, or 1

a..... b..... c, 1..... c, 2..... d, 1..... d, 2.....

WEIGHTED SCORE

Remarks ( ).....

R LOGICAL MEMORY Series.....

SCORE

Reading time.....seconds Errors..... Mispronunciations.....

Falsifications..... Number of ideas recalled.....

WEIGHTED SCORE

Remarks ( ).....

Fig. 58.—Individual Examination Blank (third page).

S COMPREHENSION Series.....	RIGHT	WRONG	SCORE
(a)			
(b)			
(c)			WEIGHTED SCORE
(d)			
(e)			
Remarks ( )			

T SENTENCE CONSTRUCTION Series.....	TIME	SCORE
(a)		
(b)		WEIGHTED SCORE
(c)		
Remarks ( )		

GIVE AT THIS POINT TEST I, DIGITS BACKWARDS.

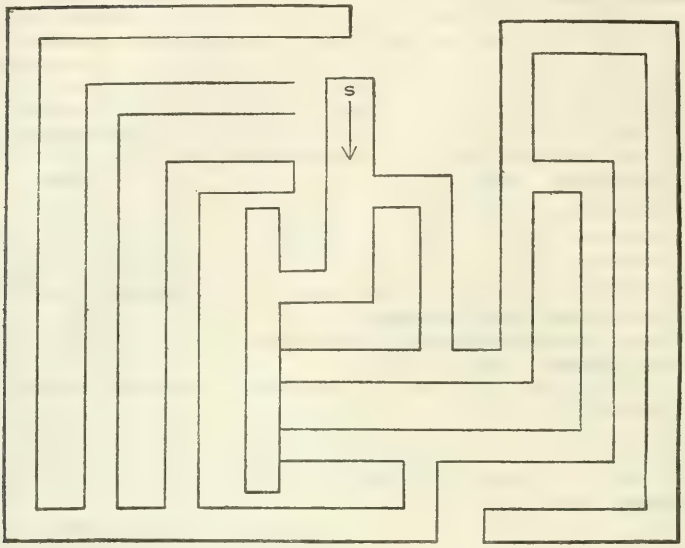
U ARITHMETICAL REASONING Series.....	SCORE
(a)..... (b)..... (c)..... (d)..... (e).....	
Additional Problems:.....	WEIGHTED SCORE
.....	
Remarks ( )	

V CODE LEARNING Series.....	SCORE
e..... f..... g..... h..... i..... j..... k..... l..... m.....	
Remarks ( )	WEIGHTED SCORE
.....	

GIVE AT THIS POINT TEST J, VOCABULARY.

General Remarks:

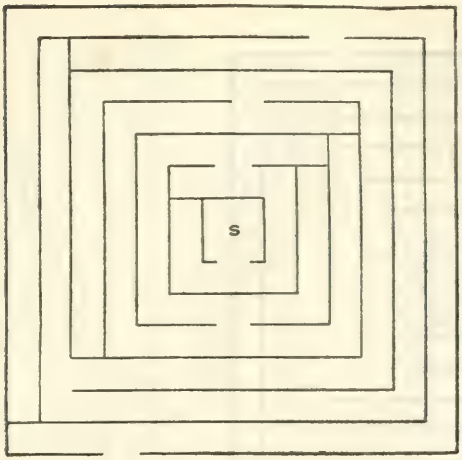
Fig. 59.—Individual Examination Blank (fourth page).



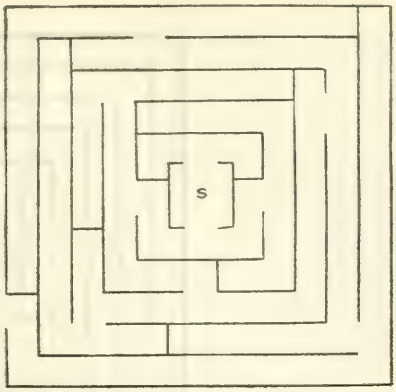
Test D, Maze 10. Time..... Errors.....

Test Q, a.

Fig. 60.—First Maze, Test D, Individual Examination.



Test D. Maze 11. Time..... Errors.....



Test D. Maze 12. Time..... ..., Errors ....

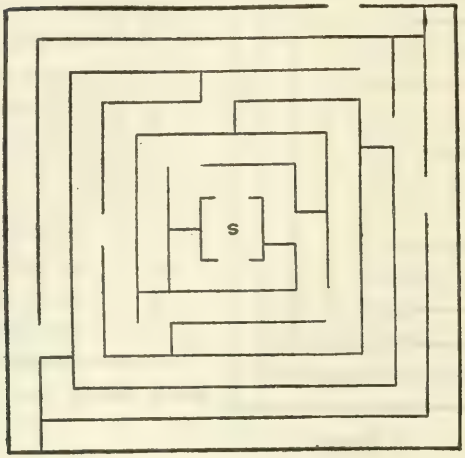
Test Q, b.

Fig. 61.[1]—Second Maze, Test D, Individual Examination.

Test Q, e. 1, c. 2.

Fig. 62.[1]—Third Maze, Test D, Individual Examination.

[1] In the maze blank Figures 61 and 62, respectively, appeared on the second and third pages and faced each other. Figure 60 was on the front, and Figure 63 on the back, outside pages of the blank.



Test D. Maze 13. Time..... Errors.....

Test Q, d. 1, d. 2.

Fig. 63.—Fourth Maze, Test D, Individual Examination.

Time _____ **Stenquist Construction Test: Individual Score Sheet** Total Score _____

Name _____ Age _____ Examiner _____ Group No. _____

Company _____ Battalion _____ Regiment _____ Division _____

In what country born? _____ Years in U. S. _____ Race _____

Occupation _____ Weekly Wages _____

Schooling: Grades, 1. 2. 3. 4. 5. 6. 7. 8: High or Prep. School, Year 1. 2 3. 4: College, Year 1. 2. 3. 4.

A

Head inserted correctly _____ 2
Nut screwed on.
Properly between cross bars of handle ____ 4
Otherwise _____ 1

Score ____ (Wrench) ____ ( )

B

Complete chain of singly joined links _____ 3
One correct joint between links _____ 2
Two correct joints _____ 4
Three correct joints _____ 6
Four correct joints _____ 8

Score _____ (Chain) _____ ( )

C

Thumb lever inserted in arm holes,
Below spring, arm of lever out _____ 3
Above spring wrong side forward _____ 8

Score __ (Tube shut-off) __ ( )

D

Thumb lever on pin either way _____ 1

Gear on pin right side up in mesh with lever __ 1

Knockers right side up in mesh with gear ___ 2

Cover screwed on _____ 1

Spring hooked _____ 2

Score _____ (Bell) _____ ( )

E

Center stud in place _____ 2

Springs in place _____ 1
Caps in place.
Out of order _____ 1
In order _____ 3
Cover snapped,
Two sides _____ 1
Three sides _____ 2

Workability _____ 2

Score ___ (Coin box) ____ ( )

F

Spring correctly placed on one stick _____ 2
Imperfect usable clothes-pin, unsymmetrical __ 4
Symmetrical ___ 6

Score ___ (Clothes-pin) ____ ( )

G

Small lever in place _____ 2

Lock bolt in place _____ 1

Spring inserted, workably _____ 4
Properly _____ 5

Top fitted on properly and screw inserted ___ 1

Score _____ (Lock) _____ ( )

BY DIRECTION OF THE SURGEON-GENERAL

Fig. 64.—Stenquist Score Sheet.

H

Both levers backward _____ 1
One forward clear in, Other backward _____ 3
Other part way in, forward __ 4
Both part way in, forward _____ 5
Both clear in, forward, One facing wrong ___ 8
Both facing wrong __ 9

Score ____ (Paper clip) ___ ( )

I

Button properly inserted in upper ring _____ 2
Circuit-closing disk properly fitted in bottom ring _____ 2

Rings snapped together _____ 3

Score _ (Electric button) __ ( )

J

U-shaped band held in proper place by pin or wire _____ 1
Trip lever on pin.
Improperly _____ 1
Properly _____ 2

Wire lever hooked.
Improperly _____ 1
Properly _____ 2

Springs on pin, (Count best one)
Weak snap, not in slot, either way _____ 1
Weak snap, in slot, either way _____ 2
Strong snap, in slot, wrong way _____ 3
Strong snap, in slot, right way (one spring) _ 4
Both springs _____ 5

Score ___ (Mouse trap) ___ ( )

121435°—20——18

POINT SCALE EXAMINATION

Name..... Age..... Race.....

Co..... Regiment..... Arm..... Division..... Station.....

Where born..... Yrs. in U. S.....

Previous occupation..... Weekly wages.....

Education: grade reached..... H. S..... College.....

Where educated..... Yrs. in school.....

Language ability.....

Disease history, personal and family.....

.....

.....

Remarks:

Total Score.....

Mental Age.....

Rating.....

Examiner's report:

Signature of Examiner.....Date.....

Division of Psychology, Medical Department, U. S. A.

Authorized by the Surgeon-General, Feb. 8, 1918. Edition, August 7, 1918 100,000.

Fig. 65.—Point Scale Examination (first page).

Test	Credits
1. Chooses, prettier, each pair correctly twice (1 each, total 3) 1..... 2..... 3.....	
2. Sees picture lacks: (*a*) arms; (*b*) nose; (*c*) mouth; (*d*) eyes. (1 each).....	
3. Compares, twice: (*a*) Lines, 5 and 6 cm. (1).....	
(*b*) Weights, 3 and 12 grams. (1)	
(*c*) Weights, 6 and 15 grams. (1)	
4. Memory span for digits.....	
(*a*) 374. 581. (1)	
(*b*) 2947. 6135. (1)	
(*c*) 35871. 92736. (1)	
(*d*) 491572. 516283. (1)	
(*e*) 2749385. 6195847. (1)	
5. Counts backward: 20—1 (4); 15—1 (3); 10—1 (2); 5—1 (1).....	
6. Repeats: (*a*) It rains. I am hungry. (1).....	
(*b*) His name is John. It is a very fine day. (1)	
(*c*) The sun is very large and red. Our train was more than two hours late. (2)	
(*d*) It is not necessary to hurt the poor little birds. It is night and all the world rests in sleep. (2)	
7. Reaction to three Binet pictures: enumeration, (1 each); description, (2 each); interpretation, (3 each)	
(*a*) Man and boy	
(*b*) Man and woman	
(*c*) Man	
8. Arranges weights: two trials. All correct but one (1); correct (2). Trial 1..... Trial 2.....	
9. Compares: (2 each).....	
(*a*) Apple and banana	
(*b*) Wood and glass	
(*c*) Paper and cloth	
10. Defines in terms of use, (1 each); superior to use, (2 each).....	
(*a*) Spoon	
(*b*) Chair	
(*c*) Horse	
(*d*) Baby	

Fig. 66.—Point Scale Examination (second page).

TEST	CREDITS
11. Resists suggestions: (1 for each resistance) 1..... 2..... 3..... 4..... 5..... 6.....	
12. Copies (on back of this sheet) (*a*) square (1 or 2); (*b*) diamond (1 or 2).....	
13. Gives words for three minutes: 30—44 (1); 45—59 (2); 60—74 (3); 75—and over (4).....	
1st half minute 2d 3rd 4th	
5th 6th	
14. Writes (on back of this sheet) sentence containing Boston, money, river. Three words in two (2); three words in one (4).....	
15. Comprehends questions: (2 each).....	
(*a*) Missed train	
(*b*) Someone unkind	
(*c*) Action versus words	
(*d*) Forgive easier	
16. Draws (on back of this sheet) designs from memory, after 15 sec. exposure. (1 or 2 each).....	
17. Sees absurdity: (1 each).....	
(*a*) Swinging cane	
(*b*) Unfortunate cyclist	
(*c*) Three brothers	
(*d*) Guide-post directions	
(*e*) Last car	
18. Puts dissected sentences together. (2 each).....	
(*a*) My teacher	
(*b*) A good dog	
(*c*) We started	
19. Defines (*a*) Charity (2).....	
(*b*) Obedience (2)	
(*c*) Justice (2)	
20. Analogies: (1 each).....	
(*a*) Oyster is to shell as banana is to	
(*b*) Arm is to elbow as leg is to	
(*c*) Head is to hat as hand is to	
(*d*) Truth is to falsehood as straight line is to	
(*e*) Known is to unknown as present is to	
(*f*) Storm is to calm as war is to	

[1]Fig. 67.—Point Scale Examination (third page).

[2]The fourth page of the Point Scale Examination booklet was blank.

STANFORD-BINET EXAMINATION

Name..... Age..... Race.....
Company..... Regiment..... Arm..... Division..... Station.....
Where born..... Years in U. S. .....
Previous occupation..... Weekly wages.....
Education: grade reached..... High School..... College.....
Where educated..... Years in school.....
Disease history, personal and family..... .....
.....

Report

Examiner..... Date.....

Yr.	Credit	Yr.	Credit	Yr.	Credit
3		8		14	
4		9		16	
5		10		18	
6		11		**M. Age**	
7		12		**Rating**	

Credits

Year III

(6 TESTS, 2 MONTHS EACH, OR 4 *TESTS, 3 MONTHS EACH).

..... *1. "Show me your": nose..... eyes..... mouth..... hair..... (3 of 4).
..... *2. Names key..... penny..... closed knife..... watch..... pencil..... (3 of 5).
..... *3. Three objects in one picture: Dutch Home
Canoe Post Office
..... 4. Gives sex.
..... *5. Gives last name.
..... 6. Repeats (1 of 3): (*a*) I have a little dog; (*b*) The dog runs after the cat; (*c*) In summer the sun is hot.
..... Alt. Repeats (1 of 3): 641..... 352..... 837

Year IV

(6 TESTS, 2 MONTHS EACH, OR 4 *TESTS, 3 MONTHS EACH).

..... *1. Compares lines (3 of 3, or 5 of 6).
..... 2. Discriminates (7 of 10): Circle..... square..... triangle..... other errors.....
..... *3. Counts 4 pennies (no error).
..... *4. Copies square (pencil, 1 of 3): *a*..... *b*..... *c*.....
..... *5. Comprehends (2 of 3). What must you do when you are (*a*) sleepy. (*b*) cold. (*c*) hungry.
..... 6. Repeats (1 of 3): 4739..... 2854..... 7261.....
..... Alt. Repeats (1 of 3 correct, or 2 with 1 error each):
a. The boy's name is John. He is a very good boy.
b. When the train passes you will hear the whistle blow.
c. We are going to have a good time in the country.

Year V

(6 TESTS, 2 MONTHS EACH, OR 4 *TESTS, 3 MONTHS EACH).

..... *1. Compares weights (2 of 3): 3—15..... 15—3..... 3—15.....
..... 2. Colors (no error): red..... yellow..... blue..... green.....
..... *3. Aesthetic comparison (no error): *a*..... *b*..... *c*.....
..... *4. Definitions (use or better, 4 of 6):
chair doll
horse pencil
fork table
..... *5. Patience (2 of 3, 1 minute each): *a*..... *b*..... *c*.....
..... 6. Three commissions. Key on chair..... brings box..... shuts door.....
..... Alt. "How old are you?"

Division of Psychology, Medical Department, U. S. A.
Authorized by the Surgeon General, Feb. 8, 1918. Edition, August 7, 1918. 100,000

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Fig. 68.—Stanford-Binet Examination (first page).

Year VI

Credits (6 tests, 2 months each, or 4 *tests, 3 months each).

..... *1. "Show me your": R. Hand..... L.Ear..... R.Eye..... L.Hand.....
R.Ear..... L.Eye.....
(3 of 3, or 5 of 6).

..... *2. Missing parts (3 of 4, 25 sec. each): eye..... mouth..... nose.....
arms.....

..... *3. Counts 13 pennies (1 of 2 trials. No error).

..... *4. Comprehends (2 of 3): *a* Raining. *b* House on fire. *c* Missed car.

..... 5. "What is that?" (3 of 4): nickel..... penny..... quarter..... dime.....

..... 6. Repeats (1 correct, or 2 with 1 error each):
a. We are having a fine time. We found a little mouse in the trap.
b. Walter had a fine time on his vacation. He went fishing every day.
c. We will go out for a long walk. Please give me my pretty straw hat.

..... Alt. Morning or afternoon?

Year VII

(6 tests, 2 months each, or 4 *tests, 3 months each).

..... 1. Fingers (no error): R..... L..... Both.....

..... *2. "What is this picture about?" (2 of 3 description).
a. Dutch Home.
b. Canoe.
c. Post Office.

..... 3. Repeats (1 of 3): 31759..... 42835..... 98176.....

..... 4. Ties bow-knot (single bow half credit, 1 minute): Time.....
method.....

..... *5. Gives differences (2 of 3): fly and butterfly
stone and egg wood and glass

..... *6. Copies diamond (pen, 2 of 3): *a*..... *b*..... *c*.....

..... Alt. 1. Days of week (15 sec.)..... Day before Tues..... Thurs.....
Fri..... (2 checks of 3)

..... *Alt. 2. Repeats backwards (1 of 3): 283..... 427..... 958.....

Year VIII

(6 tests, 2 months each, or 4 *tests, 3 months each).

..... *1. Ball and field (inferior plan or better).

..... *2. Counts 20-1. (40 seconds. 1 error allowed). Time..... Errors.....

..... *3. Comprehends (2 of 3): What's the thing for you to do:
a. Broken something.
b. Danger of being late.
c. Someone hits you.

..... *4. "In what way are..... alike?" (2 of 4)
wood and coal iron and silver
apple and peach ship and automobile

..... 5. "What is a....." (Superior to use. 2 of 4):
balloon football
tiger soldier

..... 6. Vocabulary, 20 words.

Alt. 1. Coins (no errors) .05..... .01..... .25..... .10..... 1.00.....
.50.....

..... Alt. 2. Dictation: "See the little boy." (1 minute) Time..... Score.....

Fig. 69.—Stanford-Binet Examination (second page).

Year IX

(6 TESTS, 2 MONTHS EACH, OR 4 *TESTS, 3 MONTHS EACH).

..... *1. Date (error of 3 days in *c*, none in *a*, *b*, *d*):
day of week..... month..... day of month..... year.....

..... *2. Arranges weights (2 of 3): *a*..... *b*..... *c*..... Method.....

..... *3. Makes change (2 of 3, 15 sec. each): 10-4..... 15-12..... 25-4.....

..... *4. Repeats backwards (1 of 3): 6528..... 4937..... 8629.....

..... 5. Three words (2 of 3, 1 min. each: 1 sentence of not over 2 coordinate clauses):
a. Boy, river, ball.
b. Work, money, men.
c. Desert, rivers, lakes.

..... 6. Rhymes (3 for each, 1 minute, each part) day
mill spring

..... Alt. 1. Months (15 seconds. 1 error)..... Before Apr..... July.....
Nov..... (2 checks of 3)

..... Alt. 2. Stamps. Total value. 2d trial if values known.

Year X

(6 TESTS, 2 MONTHS EACH, OR 4 *TESTS, 3 MONTHS EACH).

..... 1. Vocabulary, 30 words.

..... *2. Absurdities (4 of 5, 30 sec. each): *a*. Road to city.
b. More cars on train *d*. R. R. accident.
c. Body of girl. *e*. Bicycle rider.

..... *3. Designs from memory. Expose 10 sec. (1 correct, 1 half correct):
a..... *b*.....

..... 4. Reading and report (8 memories, 35 seconds, 2 mistakes in reading) Memories..... Time for reading..... Mistakes.....

..... *5. Comprehends (2 of 3): *a*. Opinion of some one.
b. Undertaking something.
c. Actions *vs*. words.

..... *6. 60 words: 1..... 2..... 3.....
4..... 5..... 6.....

..... Alt. 1. Repeats (1 of 2): 374859..... 521746.....

..... Alt. 2. Repeats (1 of 3 correct or 2 with 1 error each):
a. The apple tree makes a cool pleasant shade on the ground where the children are playing..... *b*. It is nearly half-past one o'clock; the house is very quiet and the cat has gone to sleep..... *c*. In summer the days are very warm and fine; in winter it snows and I am cold.....

..... Alt. 3. Healy-Fernald puzzle A (3 times in 5 minutes): *a*..... *b*.....
c..... Method.....

Year XII

(8 TESTS, 3 MONTHS EACH, OR 5 *TESTS, 5 MONTHS EACH).

..... 1. Vocabulary, 40 words.

..... 2. Defines (3 of 5): pity revenge charity
envy justice

..... *3. Ball and field (superior plan).

..... 4. Dissected sentences (2 of 3, 1 min. each): *a*.
b.
c.

..... *5. Fables (Score 4): Hercules Eggs
Fox Stork Donkey

..... *6. Repeats backwards (1 of 3): 31879..... 69482..... 52961.....

..... *7. "Explain this picture" (3 of 4): Dutch Home
Canoe P. O. Col. Home

..... *8. "In what way are..... alike?" (3 of 5) Snake, cow, sparrow.
Book, teacher, newspaper. Wool, cotton, leather.
Knife-blade, penny, piece of wire. Rose, potato, tree.

Fig. 70.—Stanford-Binet Examination (third page).

Year XIV

(6 TESTS, 4 MONTHS EACH, OR 4 *TESTS, 6 MONTHS EACH).

1. Vocabulary, 50 words. (Follow this by XVIII 2 if latter is to be given).
*2. Induction (gets rule by 6th). 1..... 2..... 3..... 4..... 5..... 6.....
3. President and king (2 of 3): Power, accession, tenure.
*4. Problems (2 of 3): Hanging
Queer visitors Indian
*5. Arithmetical reasoning (2 of 3, 1 min. each) *a*..... *b*..... *c*.....
*6. Clock (2 of 3): 6:22..... 8:10..... 2:46.....
Alt. Repeats (1 of 2): 2183439..... 9728475.....

Year XVI

(6 TESTS, 5 MONTHS EACH, OR 4 *TESTS, 7½ MONTHS EACH).

1. Vocabulary, 65 words.
*2. Fables (score 8). See yr. XII.
3. Differences (3 of 4): Laziness and idleness
evolution and revolution
poverty and misery
character and reputation
*4. Boxes (3 of 4): *a*. 2 smaller, 1 inside.....
b. 2, 2..... *c*. 3, 3..... *d*. 4, 4.....
*5. Repeats backwards (1 of 3): 471952..... 583294..... 752638.....
6. Code (2 errors, 6 min.): errors..... time..... method.....
Alt. 1. Repeats (1 of 2): *a*. Walter likes very much to go on visits to his grandmother, because she always tells him many funny stories.....
b. Yesterday I saw a pretty little dog in the street. It had curly brown hair, short legs, and a long tail.....
*Alt. 2. Comprehends physical relations (2 of 3):
a. Path of cannon ball.
b. Weight of fish in water.
c. Hitting distant mark.

Year XVIII

(6 TESTS, 6 MONTHS EACH, OR 4 *TESTS, 9 MONTHS EACH).

1. Vocabulary, 75 words.
*2. Binet's paper cutting test. (If given must come before XIV₂)
3. Repeats (1 of 3) : 72534896..... 49853762..... 83795482.....
*4. Repeats thought of passage (1 of 2):
a.
b.
*5. Repeats backwards (1 of 3): 4162593..... 3826475..... 9452837....
*6. Ingenuity (2 of 3, 5 minutes each):
a. Given 3 and 5, get 7 "Begin with 5" (Explain if not solved.)
b. Given 5 and 7, get 8 "Begin with 5"
c. Given 4 and 9, get 7 "Begin with 4"
Vocabulary:

1.....	2.....	3.....	4.....	5.....	6.....	7.....	8.....	9.....	10.....
11.....	12.....	13.....	14.....	15.....	16.....	17.....	18.....	19.....	20.....
21.....	22.....	23.....	24.....	25.....	26.....	27.....	28.....	29.....	30.....
31.....	32.....	33.....	34.....	35.....	36.....	37.....	38.....	39.....	40.....
41.....	42.....	43.....	44.....	45.....	46.....	47.....	48.....	49.....	50.....
51.....	52.....	53.....	54.....	55.....	56.....	57.....	58.....	59.....	60.....
61.....	62.....	63.....	64.....	65.....	66.....	67.....	68.....	69.....	70.....
71.....	72.....	73.....	74.....	75.....	76.....	77.....	78.....	79.....	80.....
81.....	82.....	83.....	84.....	85.....	86.....	87.....	88.....	89.....	90.....
91.....	92.....	93.....	94.....	95.....	96.....	97.....	98.....	99.....	100.....

Fig. 71.—Stanford-Binet Examination (fourth page).

PERFORMANCE SCALE EXAMINATION

Name..... Age..... Race.....
Company..... Regiment..... Arm..... Division.....
Where born..... Years in U. S.....
Previous occupation..... Weekly wages.....
Education: Grade..... H. S..... College.....
Where educated..... Years in school.....
Language ability.....
Disease history, personal and family.....

Total score..... Percentile rank..... Rating.....
Remarks.....

Examiners report.....

Examiner..... Date.....

1. Ship Test (5 min.)

	Time: Credit only if accuracy = 18, 19 or 20							Cr. for Accuracy	Score	Wtd. Sc.
	0–20	21–30	31–50	51–80	81–120	121–300	T.L.			
Credit	5	4	3	2	1	0	0			

2. Manikin and Feature Profile

								Cr. for Accuracy	Score	Wtd. Sc.
(a) Manikin (2 min.)	Time: Credit only if accuracy = 4 or 5									
	0–10	11–15	16–20	21–30	31–50	51–120	T.L.			
Credit	5	4	3	2	1	0	0			
(b) Feature profile (5 Min.)	Time: Credit only if accuracy = 5									
	0–30	31–40	41–60	61–80	81–120	120–300	T.L.			
Credit	5	4	3	2	1	0	0			

3. Cube Imitation

Response	+ or −	Score	Wtd. Sc.
(a) 1–2–3–4			
(b) 1–2–3–4–3			
(c) 2–3–4–1			
(d) 1–3–2–4			
(e) 1–3–1–2–4			
(f) 1–4–3–2–4			
(g) 1–3–2–4–1–3			
(h) 1–4–2–3–4–1			
(i) 1–4–3–1–2–4			
(j) 2–3–1–2–4–2			

4. Cube Construction (2 min. each. Unassembled blocks 6 moves, misplaced blocks 3 moves)

	Time: Credit only if blocks all assembled						Moves: Credit						Score	Wtd. Sc.
(a)	1–10	11–25	26–50	51–80	81–120	T.L.	9	10–11	12–15	16–25	26–50	over 50		
(b)	1–20	21–30	31–50	51–80	81–120	T.L.	9	10–11	12–15	16–25	26–50	over 50		
(c)	1–20	21–30	31–50	51–80	81–120	T.L.	8	9–10	11–15	16–25	26–50	over 50		
Credit	5	4	3	2	1	0	5	4	3	2	1	0		

5. Form Board

	Time: Credit only if solved						Moves: Credit only if solved						Score	Wtd. Sc.
(a) (2 min.)	0–10	11–20	21–40	41–70	71–120	T.L.			3	4	5–7	over 7		
(b) (2 min.)	0–10	11–20	21–40	41–70	71–120	T.L.			5	6	7–10	over 10		
(c) (3 min.)	0–20	21–40	41–70	71–110	111–180	T.L.	8	9	10–11	12–14	15–20	over 20		
Credit	5	4	3	2	1	0	5	4	3	2	1	0		

6. Designs (2 min. each)

	a	b	c1	c2	d1	d2	Score	Wtd. Sc.
Credit								

Division of Psychology, Medical Department, U. S. A., Authorized by the Surgeon General, Feb. 23, 1918.
Edition, Mar. 6, 1918, 20,000.

Fig. 72.—Performance Scale Examination (first page).

7. Digit Symbol	Time if less than 2 min.	Right	Wrong	Score	Wtd. Sc.

8. Maze Test (2 min. each)	Time: credit if exit is made					Credit for success	Score	Wtd. Sc.
(a)	0–20	21–40	41–70	71–120	T.L.			
(b)	0–20	21–40	41–70	71–120	T.L.			
(c)	0–20	21–40	41–70	71–120	T.L.			
(d)	0–20	21–40	41–70	71–120	T.L.			
Credit.....	3	2	1	0	0			

9. Picture Arrangement (3 min. each)	Time: credit only if accuracy = 5					Arrangement	Cr. for Arr.	Score	Wtd.Sc.
(a)	1–30	31–60	61–120	121–180	T.L.				
(b)	1–30	31–60	61–120	121–180	T.L.				
(c)	1–30	31–60	61–120	121–180	T.L.				
(d)	1–30	31–60	61–120	121–180	T.L.				
Credit.....	3	2	1	0	0				

10. Picture Completion (10 min.)											Time	Score	Wtd. Sc.
Number.....	1	2	3	4	5	6	7	8	9	10			
Selection													
Credit													

Designs

(a)

(b)

(c)

(d)

Fig. 73.—Performance Scale Examination (second page).

Digit-Symbol Test

1	2	3	4	5	6	7	8	9
—	И	⊐	L	∪	O	∧	X	=

Sample																								
2	1	3	1	2	4	3	5	3	1	2	1	3	2	1	4	2	3	5	2	3	1	4	6	3
1	5	4	2	7	6	3	5	7	2	8	5	4	6	3	7	2	8	1	9	5	8	4	7	3
6	2	5	1	9	2	8	3	7	4	6	5	9	4	8	3	7	2	6	1	5	4	6	3	7

Demonstration Maze

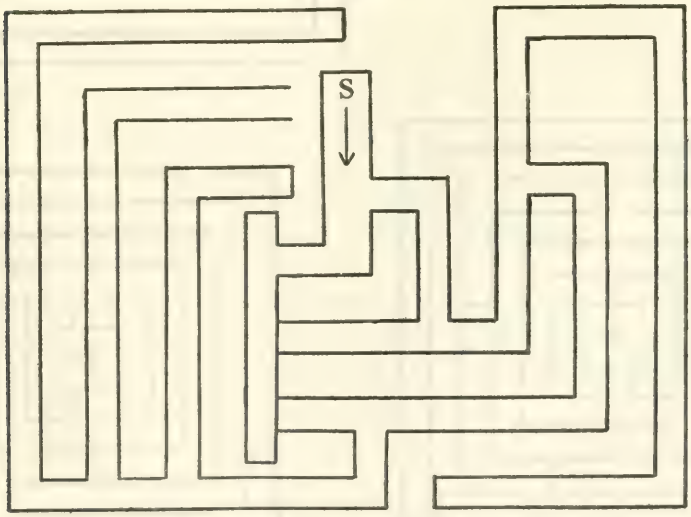

Fig. 74.—Performance Scale Examination (third page).

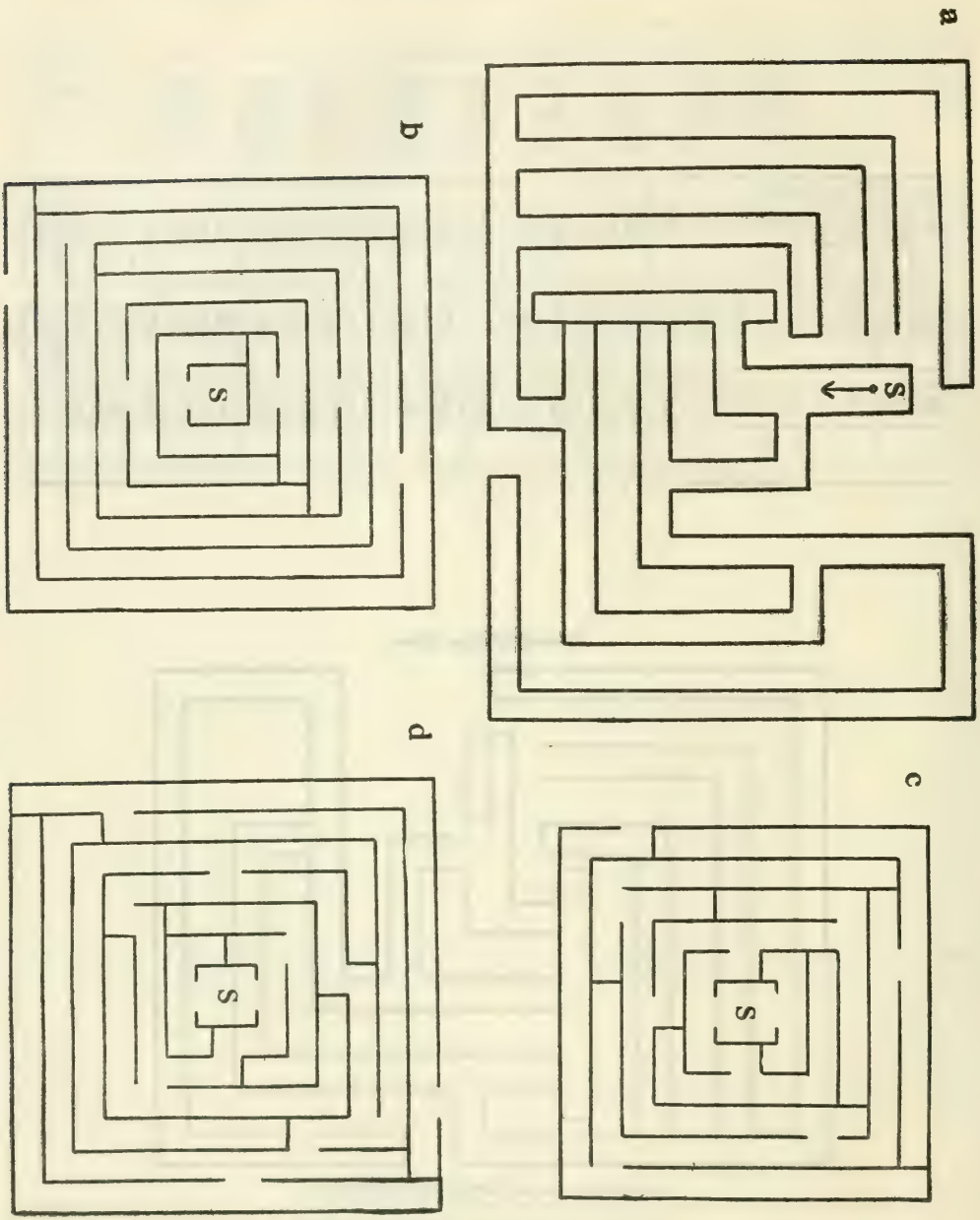

Fig. 75.—Performance Scale Examination (fourth page).

SECTION 12.—*Literacy tests.*

(1) THORNDIKE LITERACY TEST.

The literacy test used is adapted from Thorndike's visual word vocabulary test. Accurate norms for the modified form here employed are not available, but the approximate norms are as follows:

Line 4, correct or nearly so, high-school literacy.
Line 3, correct or nearly so, eighth-grade literacy.
Line 2, correct or nearly so, sixth-grade literacy.
Line 1 (and part of 2), correct or nearly so, fourth-grade literacy.
Line 1, correct or nearly so, second-grade literacy.

This was given to all men at the time they were assembled for group intelligence examination *a* and preceded the latter. As soon as the men were seated (group of not more than 80), each was supplied with a literacy test blank (blank side up) and a pencil. After the materials were distributed, examiner said, "Turn over the paper. Read what it says, and do what it tells you to do. Ask no questions. You will have 3 minutes." After 3 minutes the papers were collected and quickly looked over by three or four assistants while the men remained seated. This did not require more than 3 to 5 minutes. Those who had filled the blanks and had made few or no errors in line 3 remained seated for group intelligence examination *a*. Those who could not write or who had made many errors in lines 1 and 2 were sent at once to the group skill tests. Coaching was prevented by using literacy blanks A, B, C, and D in miscellaneous order.

Form A.

LITERACY TEST.

Write your name here ---------- Age ----------

Write in this line the company you belong to ----------

Write in this line the regiment you belong to ----------

Below, write the letter F under every word that means a *flower*.

Write the letter A under every word that means an *animal*.

Write the letter N under every word that means a *boy's name*.

Write the letter T under every word that has something to do with *time*.

1. Samuel, rabbit, William, tulip, goat
2. stag, last, giraffe, Wednesday, year
3. marigold, Godfrey, rarely, otter, Elmer
4. phlox, caribou, orchid, Cyrus, petunia

Score ----------

Form B.

LITERACY TEST.

Write your name here ..... Age .....

Write in this line the company you belong to .....

Write in this line the regiment you belong to .....

Below, write the letter W under every word that means something about *war* or *fighting*.
Write the letter B under every word that means something about *business* or *money*.
Write the letter T under every word that has something to do with *time*.
Write the letter D under every word that means something about *distance* or *direction* or *location*.

1. fight, money, gun, morning, soldier
2. here, colonel, purchase, Wednesday, April
3. out-flank, lasting, freight, elevated, forgery
4. diagonal, surmounting, incessant, peculation, frontal

Score .....

Form C.

LITERACY TEST.

Write your name here..... Age.....
Write in this line the company you belong to.....
Write in this line the regiment you belong to.....
Below, write the letter F under every word that means a *flower*.
Write the letter A under every word that means an *animal*.
Write the letter N under every word that means a *boy's name*.
Write the letter T under every word that has something to do with *time*.

1. wolf, lily, bear, buttercup, elephant.
2. month, Jeffrey, Oscar, forenoon, rhinoceros.
3. hollyhock, weasel, Owen, gradual, Hiram
4. anemone, Hugh, punctual, calliopsis, Roderic.

Score .....

Form D.

LITERACY TEST.

Write your name here.....Age.....
Write in this line the company you belong to.....
Write in this line the regiment you belong to.....
Below, write the letter W under every word that means something about *war* or *fighting*.
Write the letter B under every word that means something about *business* or *money*.
Write the letter T under every word that has something to do with *time*.
Write the letter D under every word that means something about *distance* or *direction* or *location*.

1. camp, west, general, troops, south.
2. across, merchant, noon, profit, Tuesday.
3. overhanging, future, where, immediate, exterior.
4. rarely, finance, insolvent, eternal, transverse.

Score.....

(2) KELLEY LITERACY TEST.

Directions.—In giving the literacy test the first eight words are to be used as a practice series. The examiners are to pass around the room giving individual help on these words. In doing this they will discover individuals who are evidently illiterate. Mark their papers I, collect them, and send the individuals to the skill test.

Men who are able without help or with slight help to mark the first eight samples are to be given the test proper. *In this they are to receive no help.* They are to be directed to place a letter after every word even though they have to guess at some of them. As soon as an individual completes the test have him come forward or go to him, examine his paper and classify him immediately.

For rapid classification, prepare key sheets and examine, first of all, the first column (composed of words of fourth grade difficulty). If all 20 of these are correct, pass the individual as literate without examining other columns. If less than 20 are correct, examine also the second column (composed of words of fifth grade difficulty). If an individual scores 34 or more on

the first two columns, pass him as literate without examining the third column. If his score is less than 34, examine the third column (composed of words of sixth grade difficulty). A score of 47 or better on the three columns constitutes a pass.

KELLEY LITERACY TEST.

Name.....Age.....

What company do you belong to.....

What regiment do you belong to.....

In the columns below write a F after every word that means a *flower*.

Write a W after every word that means something about *war* or *fighting*.

Write a G after every word that means something *good to be* or *do*.

Write a T after every word like *now* or *then* that means something to do with *time*.

army.....( )	tulip.....( )	late.....( )	colonel.....( )
brave.....( )	violet.....( )	while.....( )	year.....( )
when.....( )	commander.....( )	before.....( )	fortress.....( )
bullet.....( )	clean.....( )	guard.....( )	defend.....( )
navy.....( )	fort.....( )	morning.....( )	carnation.....( )
at once.....( )	buttercup.....( )	captive.....( )	worthy.....( )
black.....( )	gun.....( )	lilac.....( )	first.....( )
honest.....( )	clover.....( )	whenever.....( )	cavalry.....( )
lily.....( )	hour.....( )	fair.....( )	wednesday.....( )
camp.....( )	truthful.....( )	evening.....( )	heroic.....( )
kind.....( )	captain.....( )	worthy.....( )	tuesday.....( )
flag.....( )	primrose.....( )	afterward.....( )	never.....( )
daisy.....( )	early.....( )	military.....( )	useful.....( )
early.....( )	minute.....( )	soon.....( )	conquer.....( )
fight.....( )	defeat.....( )	meantime.....( )	aster.....( )
general.....( )	afternoon.....( )	last.....( )	battery.....( )
troops.....( )	noble.....( )	generous.....( )	instant.....( )

(3) DEVENS LITERACY TEST.

Directions.—Pass the papers face down. Say: "Write your name plainly on the blank sheet before you. Below your name write your company and your regiment. Now turn your papers over."

"Now look at the first question at the top of the page, 'Do dogs bark?'; the answer is yes, so a line is drawn under the word yes following that question.

"Now look at the second question, 'Is coal white?'; here the answer is no. Coal is not white, so a line is drawn under no after that question.

"Down below on the page are a great many more questions; some of them are easy and some are hard, but all can be answered by either no or yes.

"Read these questions carefully one at a time and mark the answers to as many of them as you can.

"Remember, draw a line under the *right* answer (either no or yes) after each question that you can answer. When you are not sure you may guess. You will have five minutes. Go ahead!"

Score is the number of correct, minus the number of incorrect responses. Omissions do not count, either right or wrong. No score less than zero to be given.

Notice that one stencil will serve for all four forms of the test and that a correct set of answers for a given block of questions may be identified by eye. A perfect score in the second block, for example, may be identified by remembering 1—2—3—1.

Tentative norms for form 1, printed.—The following norms are derived from the scrores of 947 children in the Medford, Mass., schools and 99 students in Cornell University:

Below 6	Illiterate.
6 to 20	Primary.
21 to 25	Grammar.
26 to 30	Junior high school.
31 to 35	Senior high school.
36 to 42	College.

Form I.]

Name..... Grade.....

DENENS LITERACY TEST.

Draw a line under *right* answer.

Do dogs bark?..... No. Yes.
Is coal white?..... No. Yes.

Can you see?..... No. Yes.
Do men eat stones?..... No. Yes.
Do boys like to play?..... No. Yes.
Can a bed run?..... No. Yes.
Do books have hands?..... No. Yes.
Is ice hot?..... No. Yes.
Do winds blow?..... No. Yes.

Have all girls the same name?..... No. Yes.
Is warm clothing good for winter?..... No. Yes.
Is this page of paper white?..... No. Yes.
Are railroad tickets free?..... No. Yes.
Is every young woman a teacher?..... No. Yes.
Is it always perfect weather?..... No. Yes.
Is the heart within the body?..... No. Yes.

Do clerks enjoy a vacation?..... No. Yes.
Is the President a public official?..... No. Yes.
Would you enjoy losing a fortune?..... No. Yes.
Does an auto sometimes need repair?..... No. Yes.
Is it important to remember commands?..... No. Yes.
Are avenues usually paved with oxygen?..... No. Yes.
Do we desire serious trouble?..... No. Yes.

Is practical judgment valuable?..... No. Yes.
Ought a man's career to be ruined by accidents?..... No. Yes.
Do you cordially recommend forgery?..... No. Yes.
Does an emergency require immediate decision?..... No. Yes.
Should honesty bring misfortune to its possessor?..... No. Yes.
Are gradual improvements worth while?..... No. Yes.
Is a punctual person continually tardy?..... No. Yes.

Are instantaneous effects invariably rapid?..... No. Yes.
Should preliminary disappointment discourage you?..... No. Yes.
Is hearsay testimony trustworthy evidence?..... No. Yes.
Is wisdom characteristic of the best authorities?..... No. Yes.
Is extremely athletic exercise surely necessary?..... No. Yes.
Is incessant discussion usually boresome?..... No. Yes.
Are algebraic symbols ever found in manuals?..... No. Yes.

Are tentative regulations ever advantageous?..... No. Yes.
Are "diminutive" and "Lilliputian" nearly identical?..... No. Yes.
Is an infinitesimal titanic bulk possible?..... No. Yes.
Do all connubial unions eventuate felicitously?..... No. Yes.
Is a "gelatinous exaltation" ridiculous?..... No. Yes.
Are "sedate" and "hilarious" similar in meaning?..... No. Yes.
Is avarice sometimes exhibited by cameos?..... No. Yes.

R.....
W.....
Score.....

[Form 2.]

Name..... Grade.....

DEVENS LITERACY TEST.

Draw a line under the *right* answer.

Do dogs bark?..... No. **Yes.**
Is coal white?..... No. **Yes.**

Can a dog run?..... No. **Yes.**
Is water dry?..... No. **Yes.**
Can you read?..... No. **Yes.**
Do stones talk?..... No. **Yes.**
Do books eat?..... No. **Yes.**
Do cats go to school?..... No. **Yes.**
Are six more than two?..... No. **Yes.**

Is John a girl's name?..... No. **Yes.**
Are there letters in a word?..... No. **Yes.**
Is your nose on your face?..... No. **Yes.**
Can you carry water in a sieve?..... No. **Yes.**
Do soldiers wear uniforms?..... No. **Yes.**
Does it rain every morning?..... No. **Yes.**
Are newspapers made of iron?..... No. **Yes.**

Are "forward" and "backward" directions?..... No. **Yes**
Do many people attend motion-picture theatres?..... No. **Yes.**
Do handkerchiefs frequently injure human beings?..... No. **Yes.**
Do magazines contain advertisements?..... No. **Yes.**
Are political questions often the subject of debates?..... No. **Yes.**
Are empires inclosed in envelopes?..... No. **Yes.**
Are members of the family usually regarded as guests?..... No. **Yes.**

Is genuine happiness a priceless treasure?..... No. **Yes.**
Do imbeciles usually hold responsible offices?..... No. **Yes.**
May chimneys be snipped off with scissors?..... No. **Yes.**
Is moderation a desirable virtue?..... No. **Yes.**
Are apish manners desired by a hostess?..... No. **Yes.**
Do conscientious brunettes exist?..... No. **Yes.**
Do serpents make oblong echoes?..... No. **Yes.**

Do voluntary enlistments increase the army?..... No. **Yes.**
Is hypocrisy approved by honest men?..... No. **Yes.**
Is virile behavior effeminate?..... No. **Yes.**
Do alleged facts often require verification?..... No. **Yes.**
Do pestilences ordinarily bestow great benefit?..... No. **Yes.**
Are painters ever artless individuals?..... No. **Yes.**
Do the defenders of citadels sometimes capitulate?..... No. **Yes.**

Do physicians ameliorate pathological conditions?..... No. **Yes.**
Is embezzlement a serious misdemeanor?..... No. **Yes.**
Do vagrants commonly possess immaculate cravats?..... No. **Yes.**
Are "loquacious" and "voluble" opposite in meaning?..... No. **Yes.**
May heresies arise among the laity?..... No. **Yes.**
Are piscatorial activities necessarily lucrative?..... No. **Yes.**
Do tendrils terminate in cerebral hemorrhages?..... No. **Yes.**

R.....
W.....
Score.....

[Form 3.]

Name..... Grade.....

DEVENS LITERACY TEST.

Draw a line under the *right* answer.

Do dogs bark?..... No. Yes.
Is coal white?..... No. Yes.

Does a baby cry?..... No. Yes.
Can a hat speak?..... No. Yes.
Do hens lay eggs?..... No. Yes.
Is a stone soft?..... No. Yes.
Is one more than seven?..... No. Yes.
Do the land and sea look just alike?..... No. Yes.
Are some books black?..... No. Yes.

Does water run up hill?..... No. Yes.
Are stamps used on letters?..... No. Yes.
Do 100 cents make a dollar?..... No. Yes.
Are we sure what events will happen next year?..... No. Yes.
Do ships sail on railroads?..... No. Yes.
Do stones float in the air?..... No. Yes.

May meat be cut with a knife?..... No. Yes.
Are ledges common in mountain districts?..... No. Yes.
Does success tend to bring pleasure?..... No. Yes.
Are diamonds mined in mid-ocean?..... No. Yes.
Is misuse of money an evil?..... No. Yes.
Should criminals forfeit liberty?..... No. Yes.
Is special information usually a disadvantage?..... No. Yes.
Are attempted suicides always fatal?..... No. Yes.

Are exalted positions held by distinguished men?..... No. Yes.
Does confusion favor the establishment of order?..... No. Yes.
Is a civil answer contrary to law?..... No. Yes.
Is a dilapidated garment nevertheless clothing?..... No. Yes.
Are textile manufacturers valueless?..... No. Yes.
Do thieves commit depredations?..... No. Yes.
Does close inspection handicap accurate report?..... No. Yes.

Do transparent goggles transmit light?..... No. Yes.
Do illiterate men read romances?..... No. Yes.
Is irony connected with blast furnaces?..... No. Yes.
Do avalanches ever descend mountains?..... No. Yes.
Are scythes always swung by swarthy men?..... No. Yes.
Do pirates accumulate booty?..... No. Yes.
Are intervals of repose appreciated?..... No. Yes.

Are intermittent sounds discontinuous?..... No. Yes.
Is an avocational activity ordinarily pleasurable?..... No. Yes.
Are pernicious pedestrians translucent?..... No. Yes.
Are amicable relationships disrupted by increased congeniality?..... No. Yes.
Are many nocturnal raids surreptitiously planned..... No. Yes.
Are milksops likely to perpetrate violent offenses?..... No. Yes.
Are "precipitancy" and "procrastination" synonymous?..... No. Yes.

R.....
W.....
Score.....

[Form 4.]

Name..... Grade.....

DEVENS LITERACY TEST.

Draw a line under the *right* answer.

Do dogs bark?..... **No. Yes.**
Is coal white?..... **No. Yes.**

Is snow cold?..... No. Yes.
Can a dog read?..... No. Yes.
Do houses have doors?..... No. Yes.
Has a horse five legs?..... No. Yes.
Are three more than ten?..... No. Yes.
Do mice love cats?..... No. Yes.
Does a hat belong to you?..... No. Yes.

Do animals have glass eyes?..... No. Yes.
Should fathers provide clothing for children?..... No. Yes.
Is it true that lead is heavy..... No. Yes.
Do poor men have much money?..... No. Yes.
Is summer colder than winter?..... No. Yes.
Can a horse tell time by a watch?..... No. Yes.
Is a city larger than a country town?..... No. Yes.

Does Christmas ever fall on Tuesday?..... No. Yes.
Do Christians often overlook faults?..... No. Yes.
Are difficult problems easily solved?..... No. Yes.
Do convicts sometimes escape from prison?..... No. Yes.
Should the courts secure justice for everybody?..... No. Yes.
Are scoundrels always intoxicated?..... No. Yes.
Is a guitar a kind of disease?..... No. Yes.

Do jugglers furnish entertainment?..... No. Yes.
Should we build on insecure foundations?..... No. Yes.
Do annual conventions take place biweekly?..... No. Yes.
Does persistent effort favor ultimate success?..... No. Yes.
Is a shrewd man necessarily admired?..... No. Yes.
Is manual skill advantageous?..... No. Yes.
Are elaborate bonnets inexpensive?..... No. Yes.

Are petty annoyances irritating?..... No. Yes.
Are false arguments valid?..... No. Yes.
Do you approve of ruthless massacres?..... No. Yes.
Do blemishes occur in complexions?..... No. Yes.
Is air found in a complete vacuum?..... No. Yes.
Do robins migrate periodically?..... No. Yes.
Are weird tales sometimes gruesome?..... No. Yes.

Do felines possess locomotor appendages?..... No. Yes.
Do demented individuals frequently have hallucinations?..... No. Yes.
Are laconic messages sometimes verbose?..... No. Yes.
Are perfunctory endeavors usually efficacious?..... No. Yes.
Would a deluge extinguish a smouldering trellis?..... No. Yes.
Are devastated suburbs exhilirating vistas?..... No. Yes.
Are "contingent" and "independent" alike in meaning?..... No. Yes.

R.....
W.....
Score.....

SECTION 13.—*Report blanks.*

The following report blanks were used during the preliminary examinations in the fall of 1917:

1. Psychological record (individual filing card).
2. Call list for individual psychological examination.
3. Report of psychological examination.
4. Summary of psychological examinations.

The following revisions and additional blanks were printed in April, 1918, for use in the regular examination of recruits:

1. Psychological record.
2. Report of psychological examination.
3. Psychological report form.
4. Weekly report form.

PSYCHOLOGICAL RECORD

INDIVIDUAL FILING CARD

NAME..... AGE.....

CO..... BAT. ..... REG. ..... DIV. .....

BIRTHPLACE .....

YRS. IN U. S. ..... RACE .....

OCCUP. ..... W'KLY WAGES .....

SCHOOLING: GRADES ..... H.S. ..... COLL. .....

GROUP INTEL.					GROUP SKILL	INDIVIDUAL TESTS					
TEST NO.	a		b		TIME ..... SCORE	TEST	SCORE	W. SCORE	TEST	SCORE	W. SCORE
	SCORE	W. SCORE	SCORE	W. SCORE							
1					A	A			L		
2					B	B			M		
3					C	C			N		
4					D	D			O		
5					E	E			P		
6					F	F			Q		
7					G	G			R		
8					H	H			S		
9					I	I			T		
10					J	J			U		
TOTAL						K			V		
PER CENTILE											

LITERACY: H.S. 8 6 4 2 0

INTEL. RATING: A B C D E

REMARKS:

Fig. 76.—Filing Card for Permanent Record of Psychological Examination. (Preliminary form.)

CALL LIST FOR INDIVIDUAL PSYCHOLOGICAL EXAMINATION.

.....,191....

TO THE COMPANY COMMANDER:

Company..... Battalion..... Regiment..... Division.....

Please direct the following men of your company to report for individual psychological examination as indicated below:

.....
Chief Psychological Examiner.

Name.	Report to.	Place.	Date.	Hour.
1	.....	.....	.....	.....

(Here followed space for 20 names.)

REPORT OF PSYCHOLOGICAL EXAMINATION.

TO THE COMPANY COMMANDER: .....191....

Company..... Battalion..... Regiment..... Division.....

Grade.	Explanation.	Number.
A	Very superior	
B	Superior	
C	Average	
D	Inferior	
E	Very inferior	

*..... m..... s.....

The standing of your men in the psychological examination is as indicated below. An asterisk (*) following the rating of a man indicates that he is illiterate; a letter **m** that he has been referred to the medical officer as being probably defective mentally; and a letter **s** that although low in intelligence and literacy he has a moderate degree of mechanical skill.

Name.	Grade.	Name.	Grade.	Name.	Grade.
1	.....	88	.....	169	.....

(Here followed space for 252 names.)

SUMMARY OF PSYCHOLOGICAL EXAMINATIONS.

Regiment..... Division..... Cantonment.....

TO THE SURGEON GENERAL,
through the Psychiatric Officer and the Division Surgeon:

Psychological examination of the members of the above regiment has been completed. The classification of men is as follows:

Grade.	Explanation.	Number.
A	Very superior (in intellectual examinations)	
B	Superior	
C	Average	
D	Inferior	
E	Very inferior	
*	Illiterate	
m	Referred to medical officer for further examination	
s	Low in intelligence or literacy, but have a moderate degree of mechanical skill	

Remarks: .....

.....

.....

Respectfully submitted,

.....
Chief Psychological Examiner.

PSYCHOLOGICAL RECORD

Name---------- Age----------

Rank---------- Co.--------- Reg.----------

Arm---------- Div.----- -----

Birthplace----------In U. S.------Race------

Occupation ----------

Schooling----------Weekly Wages----------

	GROUP EXAMINATION					INDIVIDUAL EXAM.				
Form	ALPHA		BETA		LIT	PERFORMANCE				
	Raw Score	Wtd. Score	Raw Score	Wtd. Score	Score		Raw Score	Wtd. Score	POINT SCALE	
1						1			Points	
2						2			M. Age	
3						3			C. I.	
4						4			STANFORD SCALE	
5						5			Points	
6						6			M. Age	
7						7			I. Q.	
8						8			MECHANICAL TEST	
9						9			Points	
10						10			Per cent ile	
Total										
Rating										

Recommendation

Disposition

Station

Examiner

(Ed. Mch. 9-18-1,000,000) Medical Department, U. S. A.

Fig. 77.—Filing Card for Permanent Record of Psychological Examination (revised form).

REPORT OF PSYCHOLOGICAL EXAMINATION.

Grade.	Explanation.	Number.	Per cent.
A	Very superior.		
B	Superior.		
C+	High average.		
C	Average.		
C−	Low average.		
D	Inferior.		
D−	Very inferior.		

.....191....

Company..... Regiment.....
Division.....

The standing of your men in the psychological examination is as indicated below. An asterisk (*) following the rating of a man indicates that he is relatively illiterate in English because of foreign birth, lack of education, or inferior intelligence. The letter E indicates that the man has been recommended for Development Battalion, special service organization, or discharge.

* .....E.....

Name.	Grade.	Name.	Grade.	Name.	Grade.

PSYCHOLOGICAL REPORT FORM

FOR

(1) All cases of mental deficiency recommended for discharge.

(2) All cases for which neuro-psychiatric examination is especially indicated.

[Report to be made in duplicate; one copy for division surgeon; one for S. G. O., Division of Psychology; forwarded weekly.]

Date.....191... Camp.....

Name..... Company.....

Regiment..... Arm.....

Born in..... Years in United States.....

1. Family history.....

   Personal disease history.....

2. Social status.....

3. Occupation..... Weekly wages $..... Jobs in past year.....

   .....

   .....

4. Education: Grade reached..... Age left school..... Write letters?..... Read newspapers?.....

5. General information: President?..... Own State?.....

   County?..... Make change? 10–6?..... 25–8?..... 50–14?.....

   2 for 5, how many 50?..... Know general orders?..... Names of own officers?..... Current events?.....

   .....

   Judgment.....

6. Orientation: Place?..... Date?.....

   Name days of week?.....

   Months.....

   Sun rises?..... Sets?..... Directions?.....

7. Affective state..... Troubles?.....

   .....

   Sex habits.....

8. Language and speech: English..... Defects.....

9. Company record.....

   .....

10. Alpha..... Beta..... Mental age..... Scale.....

    .....

    Peculiarities in test..... Skill test.....

REMARKS AND RECOMMENDATIONS.

.....

.....

.....

.....

.....

....., *Examiner.*

PSYCHOLOGICAL REPORT.

Station: ..... For week ending Saturday, ... 191—
(To be mailed on or before following Tuesday.)

TO THE SURGEON GENERAL, UNITED STATES ARMY:

1. Organizations examined: White ..... Colored ..... Total ..... Number men given individual examination: White ..... Colored ..... Number men given E. in individual examination: White ..... Colored .....
2. Number of men examined: Enlisted ..... Officers .....
3. Number of men examined by: Alpha only ..... Beta only ..... Beta after alpha ..... Individual: Pt. Sc. ..... St. B. ..... Perf. .....
4. Number E. grades: Alpha only ..... Beta only ..... Beta after alpha ..... Individual: Pt. Sc. ..... St. B. ..... Perf. .....
5. Mental age groups: Below 6 ..... 6 to 7 ..... 7 to 8..... 8 to 9 ..... 9 to 10 ..... 10 to 11 ..... 11 to 12 ..... 12 and above .....
6. Number cases reported for: Discharge ..... Development battalion ..... Regular training ..... Special service or training .....
7. Personnel reporting: In ..... Out ..... Ill ..... Special detail .....
8. Correspondence and reports, Surgeon General's Office:

To.	Date.	Subject.	From.	Date.	Subject.
1.			1.		
2.			2.		
3.			3.		
4.			4.		
5.			5.		
6.			6.		

9. Conferences and special activities.

10. Supplies:

	Alpha.					Beta.	Psy. Rec.	Rep. Psy. E.	Pt. Sc.	St. B.	Perf.
	5	6	7	8	9	0					
On hand											
Needed											

Other equipment needed:

Examiner: .....

NATIONAL ACADEMY OF SCIENCES

Volume XV

PSYCHOLOGICAL EXAMINING IN THE UNITED STATES ARMY

Part II

METHODS OF EXAMINING: HISTORY, DEVELOPMENT, AND PRELIMINARY RESULTS

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PSYCHOLOGICAL EXAMINING IN THE UNITED STATES ARMY.

PART II.—METHODS OF EXAMINING: HISTORY, DEVELOPMENT, AND PRELIMINARY RESULTS.

INTRODUCTION TO PART II.

This part of the official report of psychological examining in the Army does not follow the first part chronologically, but, instead, merely logically and because of necessity of arrangement. It is limited in the main to an account of the development of methods, a detailed description of methods, and the presentation of the measures of their reliability. With respect to the methodological aspect of the "service," Part II is historical, as is Part I.

The methods herein presented were, in their original form, the work of a "subcommittee on methods for the psychological examination of recruits" which was organized under the American Psychological Association and the Committee for Psychology of the National Research Council.

In general, Part II follows the method of classification used in Part I, and consists of four main divisions: (1) The methods formulated by the subcommittee, mentioned above, at Vineland, N. J., between May 28 and July 7, 1917; (2) the unofficial trial of these methods on about 4,000 recruits in the Army and Navy during July and August, 1917, under the auspices of the National Committee for Mental Hygiene, and the revision of the methods in the light of the results obtained; (3) the official trial of approved methods in four National Army cantonments between September, 1917, and January, 1918; and (4) the revision, reconstruction, and supplementation of these methods after psychological service had been extended to the entire Army in January, 1918. For this part of the report Maj. Lewis M. Terman is primarily responsible. He was materially assisted by Dr. Mabel R. Fernald, Miss Margaret V. Cobb, and Mr. Carl R. Brown. Dr. Fernald and Maj. C. S. Yoakum assembled and prepared for publication the data on examinations obtained in the revision of examination beta. Mr. Brown prepared the data and manuscript on the relation of alpha and beta scores to officer's estimates of intelligence, and on the relation of military efficiency to performance in the various tests of examination alpha and beta.

ROBERT M. YERKES,
Lieut. Colonel, U. S. R.

WASHINGTON, D. C., *May 15, 1920.*

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CHAPTER 1.

WORK OF THE COMMITTEE AT VINELAND, N. J.

The Committee on the Psychological Examination of Recruits was composed of R. M. Yerkes, chairman; W. V. Bingham, secretary; H. H. Goddard, T. H. Haines, L. M. Terman, F. L. Wells, and G. M. Whipple. It met at the Training School, Vineland, N. J., on the afternoon of May 28, 1917. The chairman reported briefly on the developments which led to the organization of the committee and enumerated the various activities of the Council of the American Psychological Association and of the psychology committee of the National Research Council with respect to the relations of psychology to military affairs. In the evening of the same day the chairman set forth his conception of the problems which faced the committee, emphasizing in particular the importance of the following: (1) The identification of intellectually incompetent recruits; (2) the identification of the psychotic; (3) the mental diagnosis of incorrigibles; (4) the selection of men for special tasks. In particular the chairman proposed that methods be developed for the use of psychological examiners in the Army. He suggested that examinations in the main be individual examinations, consisting of a short series of mental tests, which would require approximately 10 minutes for the average subject.

This presentation was followed by a discussion of the possible contributions of psychology to military efficiency, which resulted in the general conclusion that intelligence tests offered the best possibilities of practical service. It was proposed, therefore, to confine the work chiefly to the classification of recruits on the basis of intellectual ability, with special reference to the elimination of the unfit and the identification of exceptionally superior ability.

The second day was entirely devoted to a discussion of the relative merits of brief individual tests and group tests requiring a longer time. The committee unanimously agreed that an effort should be made to test all recruits. Obviously, if this was to be done by the method of interview and individual examination, the tests would have to be so brief that their reliability would be questionable. It was pointed out that the briefer the examination and the more it depended upon expert estimate by a clinical psychologist, the more difficult it would be to secure uniformity of method and interpretation of results.

SECTION 1.—*Development of a group examination.*

Fortunately, certain members of the committee had had encouraging experience with various types of group tests and believed that these or others of similar kind could be readily adapted for Army work. In this connection the contribution made by Arthur S. Otis, in devising a system of group tests, deserves special mention. The Otis tests embodied certain ingenious devices which permitted responses to be given without writing, and made possible objectivity in scoring. Otis generously placed all of his methods, together with correlational data which they had yielded, in the hands of Terman, who brought them before the committee. The scale which resulted from the committee's work bears a close resemblance to the Otis scale. Four of the 10 tests in the original Army scale for group testing were taken from the Otis scale practically without change, and certain others were shaped in part by suggestions derived from the Otis series.

The third day of work was devoted to a discussion of various tests which might be adapted for use in group examinations. After many suggestions for tests had been made, it was decided to have each member of the committee rate the tests proposed on each of several different criteria. It was agreed that the chief features determining the value of a mental test for the purpose in view were the following: (1) Adaptability for group use. (2) Validity as a measure

of intelligence; that is, its correlation with other measures of intelligence of known validity. (3) The range of intelligence measured. It was extremely desirable to secure tests which would measure ability from the upper grades of mental deficiency to very superior levels of intelligence. This criterion made it impossible to consider certain tests which have shown themselves to be excellent measures of intelligence in somewhat restricted ranges. (4) Objectivity of scoring. It was agreed that, if possible, the tests should be arranged so that the responses could be scored by means of stencils. Otis at Stanford University and Thurstone at the Carnegie Institute of Technology independently devised the stencil method of scoring intelligence tests at approximately the same date (1915). Thorndike, however, had used it as early as 1914 in the scoring of a reading test. Otis seems to have been the first to arrange a battery of intelligence tests so that they could be scored exclusively by stencils. (5) Rapidity of scoring. (6) Unfavorableness to coaching. It was proposed to select only tests which could be made up in a large number of "forms" which would be entirely different in content but equal in difficulty. (7) Unfavorableness to malingering. (8) Unfavorableness to cheating. (9) Independence of schooling. It was agreed that the aim should be to test native ability rather than the results of school training. (10) Minimum of writing in response. The aim was to secure tests which could be responded to in the main by underscoring, crossing out, etc., as in the majority of the Otis tests. (11) Interest and appeal. Everything else being equal, the more interesting test should be preferred. (12) Economy of time.

Finally, 13 tests were selected which were regarded as capable of being adapted to meet the above requirements more or less satisfactorily. These were as follows:

(1) *Vocabulary.*—Three or four definitions stated for a given word; the subject to check the best definition.

(2) *The Otis synonym-antonym test.*—Words to be checked as same or opposite.

(3) *Opposites.*—Writing the opposites of words, or selecting opposite from a set of response words.

(4) *Analogies.*—Otis, Bingham, and Thurstone form of the test, involving choice of four responses.

(5) *Completion.*—Trabue type of completion test; response either by writing the missing part or checking one of three or four alternative responses.

(6) *Disarranged sentences.*—The Otis adaptation of the Binet test.

(7) *Oral directions.*—Adapted from Abelson, Otis, Woodworth, and Wells.

(8) *Information.*—The subject to underscore the correct response, which occurs among four alternative responses. (Form suggested by Wells, Bingham, and Whipple).

(9) *Practical judgment.*—Adaptation of the Binet "comprehension question" test and the Bouser "selective judgment" tests. The subject checks the best of four answers to a "comprehension question."

(10) *Arithmetical reasoning.*—A series of problems ranging from easy to difficult, but involving little beyond the four fundamental mathematical processes and simple fractions.

(11) *Number series completion.*—This involves the completion of a series of numbers which is made up according to some definite plan. The test was adapted from Miss Rogers' missing number test.

(12) *Memory for digits.*—The Otis form of the "memory for digits" test, arranged for group use (each response number to be written in a square).

(13) *Number comparison.*—Underscoring the largest and the smallest numbers in a column of 10 numbers (proposed by Wells).

Each of the above tests was rated on a scale of 1 to 5 for each of the 12 criteria by five members of the committee (Haines, Terman, Wells, Whipple, and Yerkes). A composite rating was then made for the 12 tests. The following tests were finally selected for trial:

Test 1. Oral directions.

Test 2. Memory for digits.

Test 3. Disarranged sentences.

Test 4. Arithmetical reasoning.

Test 5. Information.
Test 6. Synonym-antonym.
Test 7. Practical judgment.
Test 8. Number series completion.
Test 9. Analogies.
Test 10. Number comparison.

Many different considerations helped to determine the above selection. As regards susceptibility to malingering, it appeared that the tests differed little. All agreed that the vocabulary and opposites tests are both exceptionally valid measures of intelligence; yet for good reasons neither was chosen. The committee accepted the principle that the tests should measure many aspects of intellegence. It appeared that the vocabulary test, the synonym-antonym test and the opposites test were of the same general type. The synonym-antonym test embodies most of the advantages of both the vocabulary and the opposites tests and it has the advantage of requiring less time and being more easily scored. The vocabulary test is expensive in time and requires so much space that it could not be placed on a single page. It was decided, accordingly, to adopt the Otis synonym-antonym test and to eliminate the vocabulary and opposites tests from further consideration. Again, it was generally agreed that the Trabue type of completion test is a better measure of intelligence than some of the other tests finally accepted, as for example, the number-comparison or memory-for-digits tests. However, the difficulties in securing alternative forms of this test and arranging it for response without writing and objective scoring were too great to be overcome in the time available. Moreover, it seemed undesirable to include in the scale too many tests of the verbal or language type. It was thought that the absence of a language-completion test would be offset in part by the inclusion of the number-series completion test.

After the selection of 10 tests to constitute the scale for group examining, it remained to define more specifically the principles to be followed in selecting the items of the tests, and in arranging the form of each test and the general form of the scale. Among the guiding principles formulated were the following:

Each test should be composed of 10 to 40 items, ranging from easy to difficult. The time limit preferably should not exceed 3 minutes. The time allowed for a test should permit not more than 5 per cent of an average group to attempt all the items. The instructions for each test should be recited by the examiner and, at the same time, read from their examination blanks by the subjects. The directions for each test should be followed by two or three samples with the correct responses given. Ten sets of Alternative "forms" should be prepared as a safeguard against coaching. Speed and accuracy should be weighted empirically after the tests have been given to a sufficient number of subjects. It was desired to avoid overpenalizing subjects who work slowly and carefully. The following points were agreed upon for the separate tests:

1. *Oral directions.*—Ten series consisting of 10 items each. Time for test, 6 minutes. Some of the Abelson and Otis type of material and some directions of military import should be included. The material should not be informational. Responses are to be made otherwise than by writing.

2. *Memory for digits.*—Two series each of 4, 5, 6, 7, 8, and 9 digits. Credit to be determined empirically, and a series to be scored as either right or wrong without partial credits. Examiners should be drilled to secure uniformity of rate.

3. *Disarranged sentences.*—List of 20 sentences. Time limit, 3 minutes. Response by underlining the word "true" or "false." Sentences must state generally known facts.

4. *Arithmetical reasoning.*—Ten sets of 20 problems each. Time limit, 5 minutes. Response to require only writing of numbers. Problems should not involve information beyond the four fundamentals and simple fractions.

5. *Information.*—List of 40 items. Time limit, 4 minutes. Length of line approximately 12 words, so that each statement may occupy single line, with space for four alternate responses. Responses to be made by underscoring appropriate word.

6. *Synonym-antonym.*—Ten sets of 40 items each to be prepared. Time limit, 2 minutes. All the items in a single column. Response indicated by underlining "same" or "opposite." A dotted line should connect the second word of each pair with the response words.

7. *Practical judgment.*—Ten to 20 items. Time limit, 2 minutes. Alternate responses to be given, one of which is to be checked. The number of alternating responses and the method of checking them is to be determined by those delegated to work out the tentative series. The check preferably is to be brought, if possible, within two lines. The language must be simple and direct.

8. *Number series completion.*—Ten items, introducing in all four different principles. Time limit, 4 minutes.

9. *Analogies.*—Forty items, with a time limit of 4 minutes. There should be four responses from which to choose, only one of which is correct. At Whipple's suggestion it was decided to use for the three incorrect responses words which would naturally be given as a reaction in a free association test when the third term of the analogies was used as the stimulus word.

10. *Number comparison.*—Twenty columns of numbers, consisting of six or seven numbers each. The subject is to underscore the smallest number in each column. (This was later changed to the smallest and largest numbers in each column, in order to increase the test's demands upon the higher intellectual processes.) The numbers are to consist of two to four digits. The first digits in any one column are to be neither wholly the same nor wholly different. The smallest have at least one duplicate. Time limit, 2 minutes.

Since it was agreed to have 10 equivalent forms of each test as a safeguard against coaching, the question arose as to the best method of guaranteeing the equality of the different forms as regards difficulty. A solution proposed by Wells was adopted for all of the tests except that of oral directions, namely, the principle of random selection. This principle may be illustrated as follows: If it is desired to secure 10 different sets of the analogies test, each set containing 40 items, the method would be to collect 400 such items, shuffle them thoroughly, and select the items for the 10 different sets by drawing. It will later be seen how satisfactorily this method worked.

On June 1 the tests selected for group examination were assigned to various members of the committee to prepare the items for the equivalent forms. This work continued until June 4. The assignments for preparing the test material were as follows:

Oral directions to Whipple.
Memory for digits to Wells.
Disarranged sentences to Haines and Goddard.
Arithmetical reasoning to Bingham.
Information to Wells.
Synonym-antonym to Terman.
Practical judgment to Haines and Goddard.
Number series completion to Wells.
Analogies to Terman.
Number comparison to Wells.

It should be stated, however, that no one's contribution was limited to his specific assignment. Every member of the committee contributed helpful suggestions on practically every test. When tentative lists had been made out they were presented for the criticism of the group. It is impossible to apportion credit justly, for the work was primarily an example of what Royce has called "the fecundity of aggregation."

Wells's conspicuous share in this work was in part due to the fact that he had brought with him a large amount of material on memory for digits and number comparison which could be utilized without change. This material had already been arranged by the method of chance

selection. Wells had also had experience in making up an information test; accordingly this test also was assigned to him. The information test, in accordance with committee decision, draws systematically from a number of fields of knowledge.

The words used in the synonym-antonym test were all taken from a "vest-pocket" dictionary (Funk & Wagnalls), in order to guard against the inclusion of rare or technical terms. A provisional list of about 500 pairs of words was arranged by Terman and subjected to the criticism of other members of the committee. After the list had been considerably reduced by the omission of unsuitable words, 10 sets of 40 each were drawn by lot for the 10 "forms."

In making up the items of the analogies test, various types of relationship between the first two words were systematically drawn upon, such as genus-species, part-whole, cause-effect, object-attribute, opposites, etc. The three incorrect alternative responses for each item were secured by listing and using the third term of the analogy as a stimulus word in a free association test with three subjects. The three reaction words thus secured for each stimulus word were used as the three alternative responses in the corresponding test item. This method, suggested by Whipple, gave distinctive and definite character to the analogies test. To respond correctly in the test as constituted, means to select one of several habitual associations as determined by the particular type of relationship existing between the first two words.

Mention has been made of the use of the principle of random selection in making up the different "forms" of the tests. In 5 of the 10 tests it was also necessary to utilize the principle of chance in arranging the items within a given test. For example, the succession of true and false sentences in the disarranged sentence test was determined by tossing a penny. The distribution of synonyms and antonyms in the synonym-antonym test was decided in the same way. In the information test, the practical judgment test, and the analogies test, the position of the correct response in relation to the alternative responses was also determined by chance. The necessity for these precautions is obvious.

Effort was made to arrange the items in other tests in order of difficulty by inspection. In the case of certain of the tests, the individual items were rated for difficulty by several members of the committee. Later results, however, showed that the ratings are unreliable.

The instructions for giving a test were in each case formulated first by the person or persons who had been made responsible for collecting the items of that test. Every tentative formulation was submitted to the entire group for criticism. The instructions for several of the tests were recast by Whipple. The guiding principle in the wording of instructions was to make them as direct and simple as possible, and to this end the directions for each test were several times revised.

The tests chosen appeared to satisfy fairly well the criteria which had been originally laid down. The consensus of opinion in the committee on this point was as follows:

1. *Adaptability for group use.*—Thoroughly met by all.

2. *Validity as a measure of intelligence.*—A majority of the tests were known to correlate highly with good measures of intelligence. Perhaps most doubt was felt with respect to memory for digits, number comparison, and practical judgment. Memory for digits had usually given only moderately high correlations with other measures, but it had the following advantages: (1) It would lend variety to the scale; (2) it could be made up in any number of equally difficult forms; (3) it would cover a fairly wide range; (4) it was perhaps the best memory span test available for group use.

3. *Range covered.*—Met fairly well by all. It was anticipated, however, that the analogies test probably would not reach down as far as would be desirable and that the number comparison test would probably not measure well in the higher ranges. Opinion was divided on the disarranged sentence and the practical judgment tests.

4. *Objectivity of scoring.*—Met perfectly by all the tests.

5. *Rapidity of scoring.*—Met satisfactorily by all.

6. *Unfavorableness to coaching.*—Each test could readily be made up in many "forms."

7. *Unfavorableness to malingering.*—Little difference among the tests. Malingering is possible in all. Diagnosis of mental deficiency on group test alone would not be safe.

8. *Unfavorableness to cheating.*—Little difference among the tests, except that copying by one man from another is somewhat easier in oral directions, arithmetical reasoning, practical judgment, and memory for digits than in the other tests.

9. *Nondependence upon schooling.*—Members of the committee did not agree as to the influence of schooling, except in believing that the oral directions test is rather exceptionally free from such influence. Some regarded the analogies test and the synonym-antonym test as more or less objectionable on this ground. Results have given no indication that the tests differ greatly in the extent to which schooling influences the result.

10. *Response without writing.*—No writing is required, except the writing of figures in the arithmetical reasoning test, the memory for digits test, and number series completion.

11. *Interest and appeal.*—It was expected that the tests chosen would satisfy this criterion very well, although it was not expected that the rank order of the tests on this point would be the same for all types of subject.

12. *Economy of time.*—The synonym-antonym test and the practical judgment test stood first in this respect. Counting the time necessary for reading the instructions, each required about 2 minutes. Oral directions, arithmetical reasoning and memory for digits were least economical of time, requiring from 5½ to 7 minutes apiece.

By June the materials for the group test were ready for press. It was decided to print an edition of 1,000 copies for preliminary trial of the group method before undertaking to prepare methods for individual examining. Bingham accepted the responsibility of seeing the material through press. Two days later printed copies were distributed and the committee adjourned to gather data which would serve as a basis for revision and standardization.

The recess lasted from June 10 to 23. During this period trial was made of the group method by various members of the committee as follows. By Yerkes, 50 inmates of the Massachusetts School for the Feebleminded, Waverly, Mass., and 25 subjects at the Boston Psychopathic Hospital; by Wells, about 50 subjects at the Reformatory for Men, Concord, Mass.; by Haines, about 50 aviation recruits in Ohio; by Terman, about 60 high-school pupils and 43 prisoners in California; by Bingham and Goddard, assisted by N. J. Melville, 114 marines at the Philadelphia Navy Yard and 27 men at the Carnegie Institute of Technology; by Whipple, 50 men in the officers' training camp, Fort Benjamin Harrison, Ind.

The committee reassembled at Vineland on June 25 to work over carefully the results of the above tests giving particular attention to correlations with other measures of intelligence, and to methods of scoring.

The 103 high-school pupils and prisoners of California had been tested by the proposed Army test, by the Stanford-Binet scale, the Yerkes-Bridges point scale, and the Trabue language tests. The results of the Army test, both for the scale as a whole and for the 10 different tests composing it, were correlated with these other measures. A large number of the marines were given an abbreviated Binet test, and these results also were correlated with the army test. In addition, for certain groups of cases, each of the 10 tests in the Army scale was correlated with the total score of the scale. For certain groups each test was correlated with the sum of 5 tests.

Unfortunately some of the data of this preliminary trial are not at present available. The following facts, however, can be presented:

1. For Terman's 103 subjects (60 high-school pupils and 43 prisoners) the correlation of each test with Stanford-Binet mental age was as follows:

Test	1	2	3	4	5	6	7	8	9	10	Total score.
Correlation	0.66	0.56	0.71	0.73	0.73	0.75	0.77	0.25	0.82	0.29	0.87

2. For the marines the 10 tests correlated with mental age scores by Doll's brief Binet (two tests per year) as follows:

Test	1	2	3	4	5	6	7	8	9	10	Total score.
Correlation	0.40	0.37	0.68	0.57	0.60	0.68	0.72	0.47	0.50	0.31	0.81

3. For the marines each test correlated as follows with the total score of the ten tests:

Test	1	2	3	4	5	6	7	8	9	10
Correlation	0.75	0.70	0.73	0.82	0.72	0.79	0.88	0.56	0.76	0.62

4. The correlation of the total score with the number of school grades completed was 0.73.

The correlations which the tests gave were therefore in the main satisfactory. They were high with outside measures of known value; they were high enough with one another to indicate that all were reasonably good tests of general intelligence; at the same time the intercorrelations of the tests were not high enough to suggest that the tests were only repetitive of one another.

The tests were scored in various ways in order to determine the best method empirically. The principle adopted was that of finding by trial the method of scoring which would give the highest correlation with Binet or with total score. All the tests were scored both for "number right" and "right minus wrong." In addition, test 4 was also scored for "right—2 wrong"; and tests 5 and 7 for "3 right—wrong." It has been supposed that it would be found necessary to penalize, more or less extensively, for errors. However, it was found that, in general, penalizing was of little or no advantage except in those tests where it was necessary to counterbalance the factor of chance, as in tests 3 and 6. Test 4, for example, gave significantly higher correlations with Binet and with total score when scored for number right than when scored for "right—wrong" or "right—2 wrong." Only in tests 3, 6, 7, and 10 did the data justify subtraction from the score in case of error. In tests 3 and 6 the subject has an even chance of making a correct response by guessing, and this is offset by scoring the test "right—wrong." In tests 7 and 10 the advantage gained by penalizing for errors was small.

The time allowances for the tests were checked up by noting the per cent in each group who attempted all the items of a test. The following changes in time seemed to be justified: Test 1, slight reduction in time for certain items and slight increase for others. Test 2, slight decrease for certain items. Test 3, reduction from three to two minutes. Test 4, no change, five minutes. Test 5, reduction from four to three minutes. Test 6, reduction from two t one and one-half minutes. Test 7, reduction from two minutes to one minute. Test 8, reduction from four to two minutes. Test 9, reduction from four to three minutes. Test 10, unchanged, two minutes. The time allowances agreed upon at this revision remained unchanged until the original group scale was modified into the alpha scale in January, 1918.

Other results considered were the number of zero scores for different tests in various groups, the standard deviation of the scores in different tests, and the relative difficulty of the items composing the 10 tests. It will be recalled that when the group test was originally made up enough items were collected for 10 different "forms" of each of the 10 tests, so that 10 different record booklets could be used, all equally difficult but not duplicative. Only one of these forms—namely, Form A—was printed for the preliminary try-out. Hence the rearrangement of items at this time to accord with order of difficulty was made only for Form A. Even in this form no serious attempt was made to secure an exact order according to difficulty. As a result of the experiment, a few items in the tests were modified in content or form. The directions for the separate tests were modified to some extent and several changes were made in the examiner's prologue. Whipple was largely responsible for the final wording of the prologue. All the members of the committee participated in the revision of the group tests after the recess except Haines, who was unable to be present.

On July 1 word was received that $2,500 had been made available for a trial of the methods in various military organizations. On July 2 copy for Forms A, B, C, D, and E of the group examination were placed in the hands of Bingham, who was charged with the responsibility of seeing the material through press. One thousand copies of each form were printed.

SECTION 2.—*The individual examination.*

During the two days before the committee's recess and while the group examination material was in press the committee discussed methods of individual examination, giving special attention to the possibility of employing abbreviated scales. N. J. Melville and E. A. Doll were both called into conference because of their work with the abbreviated Binet.

Immediately after this conference the preparation of methods for individual examining was undertaken. It was believed that such examinations would be necessary for the men ranking lowest on the group scale, for the highest 5 or 10 per cent, and for those whose scores indicated that they were irregular or atypical. It was assumed further that the lowest group would be made up in part of genuine subnormals and in part of foreigners and others handicapped by illiteracy. It was agreed, therefore, that the methods of individual examination should be worked out with special reference to subnormals, supernormals, foreigners, and psychotics. Tentatively, Yerkes, Goddard, and Haines were charged with the formulation of tests for illiterates and psychotics; Whipple and Bingham, for superiors; and Wells and Terman, for subnormals. As it worked out, however, the contributions of the various members were not governed to any great extent by these assignments.

The question may be raised why the committee did not adopt one or more of the standardized intelligence scales in current use instead of undertaking the preparation of new methods. Perhaps the wisdom of the committee's decision is open to question in view of the fact that the methods prepared at this time were soon abandoned in favor of the Yerkes-Bridges point scale and the Stanford-Binet scale. Among the considerations which influenced the committee were the following:

(1) That current scales were not sufficiently "coach-proof"; (2) that new sets of tests could probably be devised which would give a larger variety for choice and render the method of individual examination more flexible than current methods and more readily adaptable to particular types of subjects; (3) that new tests would escape the prejudice entertained by many against the intelligence scales in general use.

Before undertaking to make a selection of tests it was agreed that the tests chosen should satisfy the following criteria: (1) They should be valid measures of intelligence; (2) reasonably "coach-proof"; (3) not too susceptible to practice effects; (4) unfavorable to malingering; (5) interesting; (6) with responses unambiguous, definite and easily scored, and the verbal element reduced to a minimum; (7) little influenced by schooling; (8) brief; and (9) using materials that are simple, convenient, and inexpensive.

In order to make the individual examination as nearly "coach-proof" as possible, it was agreed to limit the selection of tests in most cases to those for which five equivalent series of items could be devised. With this and the other criteria in mind, approximately 50 different tests proposed by various members of the committee were subjected to critical consideration. From these, 21 were selected, as follows:

Test A. Painted cube.—This test[1] was suggested to the committee by Goddard. Yerkes and Goddard modified the original test by arranging a series of steps of gradually increasing difficulty and by preparing suitable directions for giving and scoring.

Test B. The clock test.—This is the well-known Binet test of reversing the hands of the clock,[2] supplemented by the test of telling time. Three steps of graded difficulty were proposed: (1) Telling time; (2) reversing hands of clock, with clock in view; (3) same, with no clock in view. Alternative forms were prepared by Wells. The test of telling time has been shown by Gertrude Hall [3] to give a high correlation with Binet mental age.

Test C. Cube imitation.—This is the Knox test [4] as adapted by Yerkes, who also prepared the instructions. The test as given by Knox has proved valuable in testing immigrants.

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[1] For history see Jour. Educ. Psy., March, 1917, pp. 176–178.

[2] Detailed reference to the various tests originated or elaborated by Binet seems superfluous. Information regarding these can be located conveniently in the following volume: Binet, A., and Simon, Th. The Development of Intelligence in Children. Translated by Kite, E. S., 1916.

[3] Eleven Mental Tests Standardized. Eugenics and Social Welfare Bulletin No. 5, New York State Board of Charities.

[4] Knox, H. A. A Scale Based on the Work at Ellis Island for Estimating Mental Defect. J. Amer. Med. Assoc., vol. 62, 1914, p. 742.

Test D. Maze test.—The more difficult mazes of the Porteus series [1] were modified by Yerkes. Data from Porteus have correlated well with Binet mental age.

Test E. The Dearborn form board.[2]—This form board was selected because it offers a graded series of problems with reasonably wide range. The instructions were prepared by Yerkes.

Test F. Stenquist construction.—This was not included in first series of tests.

Test G. Orientational information.—This was included primarily for use with suspected psychotics. It was arranged by Yerkes and Terman and was not intended as an intelligence test. Four of the first five items are from Binet, the last five from Terman's series.[3]

Test H. Association.—Kent-Rosanoff series.[4] The instructions were prepared by Wells.

Test J. Vocabulary.—Word lists as arranged by Terman. Those of the first series were taken from the Stanford vocabulary test,[5] which had been made up by selecting every one hundred and eightieth word in the Laird and Lee Vest Pocket Dictionary. The forty words for series 1 of test J were selected from the hundred-word Stanford vocabulary test as follows: In the case of 600 adults who had been given the Stanford-Binet, success in each of the 100 words was correlated with success in the scale as a whole. The 40 words selected for the present purpose were those which had shown highest correlation with Stanford-Binet mental age. The diagnostic value of this first list is accordingly very high.

The other four series included in test J were selected thus: Four vocabulary lists of 100 words each were made up from the Laird and Lee Vest Pocket Dictionary by selecting every one hundred and eightieth word, as in the case of the original Stanford vocabulary test. Each hundred-word list thus obtained was reduced to 80 by omitting those which were either too easy or too hard to have diagnostic value in the range of intelligence ordinarily found among soldiers. The lists of eighty were then reduced to forty by dropping out alternate words. Thus far the words of series 2 to 5 were in the main "unselected," in the sense that they were selected by arbitrary rule. However, several changes were later made by substituting for words which were deemed unsuitable other words judged to be equally difficult. By "unsuitable" is meant words which tend to bring ambiguous responses, words which are more or less provincial or obsolete, words with objectionable references, etc.

The words of series 1 were arranged in order of difficulty as shown by tests of 600 adults. Those of series 2 to 5 were arranged in order of difficulty as estimated by three judges. The relative difficulty of the five series is not definitely known, but the differences are probably not great.

Test K. Letter line test.—From the Yerkes-Rossy Point Scale.[6] Yerkes credits this test to the late E. B. Huey. The test was adapted for army use by Yerkes and Melville, who prepared the instructions and the alternative series.

Test L. Dissected sentences.—From Binet. Alternative series and instructions were prepared by Melville.

Test M. Absurdities.—From Binet. The five series and the instructions were prepared by Terman, assisted by Goddard. The 50 absurdities of the five series have the following sources: Binet or various editions of the Binet scale, 9; Simpson's series, 6; Goddard, 9; Terman, 24; unknown origin, 2. The 24 absurdities furnished by Terman consisted in the main of verbal "translations" of the Terman and Williams absurd pictures.[7]

Test N. Controlled association (Rhymes).—From Binet. The instructions and the five series were arranged by Melville.

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[1] Porteus, S. D. Mental Tests for Feeble-Minded: A New Series. J. Psycho-Asthenics., vol. 19, No. 4, 1915, pp. 200-213.

[2] Dearborn, Walter F., Anderson, J. E., and Christiansen, A. O. Form Board and Construction Tests of Mental Ability. J. Educ. Psychol., vol. 7, No. 8, pp. 448-449.

[3] Terman, L. M., and Chamberlain, M. B. Twenty-three Serial Tests of Intelligence and Their Intercorrelations. J. Applied Psychol., vol. 2, No. 4, 1918, pp. 343-344.

[4] Kent, G. H., and Rosanoff, A. J. A Study of Association in Insanity. Amer. J. Insanity, vol. 47, 1910, pp. 37-96 and 317-390.

[5] Terman, L. M. The Measurement of Intelligence, 1916, pp. 224-231.

[6] Boston Medical and Surgical Journal, April, 1917, vol. 176, pp. 564-573.

[7] Terman, L. M., and Chamberlain, M. B. Twenty-three Serial Tests of Intelligence and Their Intercorrelations. J. Applied Psychol., vol. 2, No. 4, 1918, pp. 347-349.

Test O. Likenesses and differences.—Finding differences, from Binet; finding likenesses, from Stanford-Binet. The five series and the instructions were arranged by Terman, who is responsible for all but five or six of the fifty items.[1]

Test P. Ingenuity.—Devised by Terman in 1905, used by him in an experimental study of the intellectual processes of bright and dull boys.[2] Included later in the Stanford-Binet. Adapted for present use by Wells, who also prepared the instructions and the alternative problems.

Test Q. Memory for designs.—Modeled after the Binet test. The designs here used were devised by Terman. In experiments at Stanford University they had yielded high correlations with mental age.

Test R. Logical memory.—After Binet. Instructions and alternative series were prepared by Wells.

Test S. Comprehension.—After Binet. Instructions and the alternative series were prepared by Wells and Terman. Wells furnished 11 of the 25 questions, Terman 8, and Goddard the remainder.

Test T. Sentence construction (three words).—After Binet; the Masselon test. Instructions and alternative series were arranged by Melville.

Test U. Arithmetical problems.—A combination of the Binet test of making change and the Bonser type of arithmetical reasoning test.[3] Three of the five problems in the *e* series came originally from Bonser and had been later incorporated in the Stanford-Binet. The other two of the *e* series were taken from the group test of arithmetical reasoning. Instructions and alternative series were arranged by Wells.

Test V. Code learning.—The code test had been used in various forms by various psychologists, notably in the Healy[4] and Stanford-Binet[5] tests. The instructions and the five forms of the present series were prepared by Wells.

The 22 tests which have been described were not combined in a single scale. It was suggested that they be used as follows: (1) For illiterates, tests A to F; (2) for subnormals, tests J to O, supplemented by H and I, or tests P to U, supplemented by H and I; (3) for psychotics, tests D, E, F, G, I, Q, and R; (4) for supernormals, tests A, C, E, H, I, J, and O.

Apart from the limitations imposed by the criteria which the committee had agreed each test must satisfy, the choice of tests was determined by three things: (1) By the purpose to secure tests which would be of service with one or another of the types of subjects named above—illiterates, subnormals, psychotics, and supernormals; (2) by the experience which the members of the committee had had with the various types of tests proposed; and (3) by the data contained in two studies of the diagnostic value of certain Binet tests—namely, Brigham's recently published monograph[6] and Knollin's unpublished master's thesis. The latter, which was brought before the committee by Terman, gave the correlation of each test above nine years in the Stanford-Binet scale with mental age as measured by the entire scale for approximately 450 adult subjects. Knollin's data showed the following tests to have high diagnostic value: vocabulary, three words, rhymes, absurdities, designs, comprehension, dissected sentences, digits backward, giving differences and similarities, arithmetical reasoning, and ingenuity. These were included in the Army series.

Some 30 other tests were proposed, but for one reason or another rejected. Notes made by members of the committee indicate the rejections listed below, with reasons in some cases. The name in parentheses after certain of the tests indicates authorship of the particular form of test considered.

Dot cancellation (Abelson): not a good measure of intelligence. Geometric estimation (Thorndike and Woodworth): too largely on the perceptual level. Line bisection: too largely

[1] Terman, L. M., and Chamberlain, M. B. Twenty-three Serial Tests of Intelligence and Their Intercorrelations. J. Applied Psychol., vol. 2, No. 4, 1918, p. 347.

[2] Terman, L. M. Genius and Stupidity. Ped. Sem., vol. 13, 1906, p. 335.

[3] Bonser, F. G. The Reasoning Ability of Children of the Fourth, Fifth, and Sixth School Grades. Teachers' College, Columbia Univ. Contribs. to Educ., no. 37, 1910, p. 2.

[4] Healy, W. and Fernald, G. M. Tests for Practical Mental Classification. Psychol. Monog. vol. 13, whole no. 54, 1911, pp. 33-34.

[5] Terman, L. M. The Measurement of Intelligence, pp. 330-332.

[6] Brigham, C. C. Two Studies in Mental Tests. Psychol. Monog., vol. 24, whole no. 102, 1917.

perceptual. Reaction to pictures (Binet): too difficult to score. Fable interpretation (Terman): time consuming and difficult to score. Multiple choice (Yerkes): not easy to devise enough alternates or to prevent coaching. Absurd pictures (Rossolimo, Terman, Lough): time not available for devising and drawing the necessary number of pictures. Proverbs (used by Keller, Winch, Whipple, Otis, Terman, and others): too difficult for all but highest levels of intelligence. Number ranking (Wells), arranging numbers in order, putting largest at top: reason for rejection not recorded. Knowledge about familiar things (Terman), "Where does tar come from?" etc.: reasons for rejection not recorded. Sequential picture test (used by Bowler, Whipple, and others): not included because of lack of time to secure suitable alternative series of pictures. Punched holes (Thurstone): not easy to secure enough alternatives or to prevent coaching. Literary interpretation: too time consuming and "schoolish." Number completion (Rogers); two forms proposed: (1) sign missing, (2) number missing: too "schoolish." Picture completion (Heilbronner, Binet, Pintner, Kelley): time not available for devising and drawing suitable pictures. Hand and flag tests (Thurstone): too easy; hand test probably correlates with dextrality. Match board test (Kemble): reasons for rejection not recorded. Memory for sentences (Binet): digits backward considered a more suitable test of memory span and only one needed. Naming opposites: reasons for rejection not recorded. Finding reasons (Terman): rendered unnecessary by inclusion of the comprehension test, which is easier to score. Sentence completion (Trabue): probably much influenced by schooling. Healy form boards: rejected because of low value as a measure of intelligence. Naming words (Binet): adults often fail to enter into the spirit of this test.

The methods which the committee devised for individual examining are appraised more fully elsewhere (pp. 397ff., 477–480). It may be noted, however, that in the main the nine criteria which had been laid down as essential were reasonably well satisfied. (1) The large majority of the tests chosen were mental measures whose validity had been sufficiently demonstrated. (2) Coaching was rendered difficult by the formation of five alternative series for nearly all the tests. (3) Few, if any, of the tests could be regarded as more than ordinarily subject to vitiation by practice. (4) The question of susceptibility to malingering played little or no part in the choice of tests, as it was early realized by the committee that this danger would have to be guarded against by the psychological insight of the examiner rather than by the inherent nature of the tests. (5) Most of the tests were of types known to appeal to the interests of subjects who are likely to be given an individual examination. (6) One of the weakest features of several of the tests was the probability of ambiguity of response. It can not be denied that the personal equation is likely to enter in the scoring of responses to such tests as designs, logical memory, vocabulary, comprehension, likenesses, and differences. As for the avoidance of the verbal element in response, this was eliminated altogether in six of the tests and reduced to an insignificant amount in several others. (7) It could hardly be maintained that many of the tests selected are to any great extent tests of schooling rather than intelligence. The vocabulary and arithmetical reasoning tests, the two which would come most naturally under suspicion, are known not to be unduly vitiated by this factor. Non-English speaking subjects were, of course, provided for by the performance tests A, C, D, E, and P. (8) The time allowance, except for the cube construction, the Dearborn form board, and the ingenuity test, are reasonably low (chiefly from 3 to 5 minutes maximum working time). Since the plan of examination provides for giving only six or eight of the tests to a subject, the time required for an individual examination would ordinarily range from 30 to 50 minutes. (9) Only tests A, B, C, and E require material—material which is simple, convenient, and inexpensive.

As we shall see later, notwithstanding the excellent features of many of the individual tests, the methods of individual examination devised by the committee were in general abandoned after brief use in the Army in favor of the Yerkes-Bridges and Stanford-Binet scales. This was not due to unsatisfactoriness of the tests, considered individually, but to the fact that they were not welded into a systematic scale or group of standardized scales which could be used con-

veniently. The 21 tests were intended as the raw material for such scales, which it was expected would be developed as a result of Army use. That this expectation was not fulfilled was due to the immediate necessity of securing results which could be interpreted in the light of generally known standards. Such a standard was mental age and at first test scores which could not be readily translated into terms of this concept were unsatisfactory both to the psychological examiners and to the neuropsychiatric officers to whom cases were continually being referred. There is no doubt that an admirable system of tests could be wrought out of the material which the committee brought together. Five of the nonlanguage tests, in modified form, were later included in the performance scale. The tests inserted especially for use with psychotics (orientational information and the association test) were not employed to any considerable extent.

Another of the original purposes of the methods of individual examination was early abandoned—namely, the special examination of those who had made very high scores in the group test. The purposes of the individual examination were thus reduced to two—(1) the detection of low-grade intelligence and (2) the more accurate grading of foreigners.

One day had been devoted to methods of individual examination before the recess of June 10 to 24. The session following the recess extended only from June 25 to July 7. Only two weeks were available in which to revise the group examination method, devise methods of individual examination for various types of subjects, and prepare printer's copy for record blanks and Examiner's Guide with full instructions for giving and scoring the tests. Haines was not present after the recess and Whipple was compelled to leave July 2, while Bingham gave the larger part of his time from July 2 to 7 to the preparation of printer's copy for record blanks. This left the work of preparing the alternative series of items, the directions for procedure, and the copy for the Examiner's Guide to Yerkes, Goddard, Wells, and Terman, aided by Melville. Fortunately the important task of selecting the tests was carried out with all the members of the committee present except Haines, who was unable to return after the recess, but sent in valuable data on the group tests. Copy for the Examiner's Guide (a pamphlet of 76 pages) was completed and dispatched to the printer July 7.

In six weeks the committee had accomplished the following results:

1. It had formulated a plan for the psychological examination of an entire army. So far as the committee knew, no such wholesale application of psychological methods to military problems had ever before been entertained.

2. It had prepared an intelligence scale for group examining and had demonstrated its validity by trial upon 400 subjects. This scale was all but immune from the personal equation of the examiner and wholly free from the personal equation of the scorer. It made possible the examination of hundreds of men in a single day by a single psychologist.

3. It had made the scale reasonably "coach-proof" by preparing 10 alternative forms which were entirely nonduplicative in matter but psychologically identical and of approximately equal difficulty.

4. It had formulated methods of individual examination to be used with subjects for whom the group method might be inadequate or inconclusive. The scheme of individual examination included 21[1] tests, chiefly adapted from tests which had already proved their value as measures of intelligence. The list of tests provided for four types of subject—illiterate or non-English speaking, subnormal, psychotic, and supernormal.

5. For all but six of the individual tests, five alternative series of items had been prepared in order to reduce the danger of coaching.

6. Copy for an Examiner's Guide had been made ready for the printer, and an edition of 5,000 copies of the revised group test was being printed for further trial and experimentation.

7. The sum of $2,500 having been secured for a thorough trial of the methods with Army subjects, the committee had formulated a plan for this experiment. The necessary arrangements for this extensive trial were made by Bingham and Yerkes.

[1] Test F, subsequently added, increased the number to 22.

There is no desire to make the work of the committee assume an importance which it does not deserve. It would be misleading to leave the reader with the impression that the methods which the committee formulated were in any sense inventions de novo. Few inventions are. In the present instance the committee did not hesitate to borrow suitable methods or material wherever they could be found. In the tests for individual examination there was little new except a part of the materials and certain adaptations of procedure. It should be stated, however, that several members of the committee had in earlier work made important contributions to various tests included in the individual examination. For the group method somewhat more originality may be claimed. One can at least say that it made possible what had hitherto been impossible. It did this, however, far more by the adaptation of tried methods than by the wholesale creation of new ones. Conspicuously important features of the group method are: (1) The arrangement of the tests so as to permit response without writing and to secure complete objectivity of scoring; (2) the "random selection" method of securing equally difficult alternative forms; (3) the standardization of procedure. For (1) the committee was indebted more to Otis than to any other one person; for (2) the credit belongs to Wells; for (3) the committee as a whole was responsible.

The immediate origin of the 10 tests of the group method has already been indicated. The contribution of the committee with respect to them was chiefly in the line of adaptations designed to render them more serviceable for military use. Test 1 embodied the best features of the "Following directions" tests of Woodworth and Wells,[1] and of Abelson [2]. It differed from the "Geometric test" of Otis chiefly in the fact that the directions were given orally instead of being read by the subject. Test 2 was the Otis adaptation of the memory span test for group use. Test 3 was the Otis adaptation of the Binet test of disarranged sentences. Test 4 involved nothing new. Test 5 was borrowed in part from the Bureau of Salesmanship Research Tests (Carnegie Institute of Technology) and in part from an information test devised by Wells. Test 6 was taken entirely from Otis. It is more nearly an invention than any other test in the scale and in justice to its author should be associated with his name. Test 7 was a cross between the Binet comprehension test and the Bonser "selective judgment" test.[3] Test 8 was based upon Thurstone's number series completion test, while test 9 is an adaptation of the association proportion test.[4] Test 10 was proposed by Wells as an improved form of the cancellation test.

It should be stated that at this stage the committee regarded the methods as altogether tentative. A thorough trial upon several thousand soldiers under camp conditions was regarded as necessary before any steps should be taken to secure their acceptance by the War Department. Fortunately thorough trial was possible.

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[1] Woodworth, R. S. and Wells, F. L. Association Tests. Psychol. Monog., vol. 13, whole no. 57, 1911, pp. 68–72.

[2] Abelson, A. R. The Measurement of Mental Ability of "Backward" Children. Brit. J. Psychol., vol. 4, 1911, pp. 279–288.

[3] Bonser, op. cit., pp. 5–6.

[4] See especially Woodworth, R. S., and Wells, F. L., op. cit., pp. 63–64 (Mixed Relations Test).

CHAPTER 2.

UNOFFICIAL TRIAL OF METHODS.

After adjournment of the committee on methods, July 7, 1919, arrangements were made, in accordance with plans described on page 9 of this report, for trial of the methods under military conditions. The results at the four military stations were worked over by a statistical unit under Thorndike's direction and reported upon by him at a conference of the committee on methods held at Columbia University on August 15. This chapter records the more significant results of the preofficial trial.

Approximately 4,000 examinations were made by the group method, including 3,000 soldiers, 759 men in the Brooklyn Mosquito Fleet, and 372 individuals in institutions for the feeble-minded. So far as they were used for statistical purposes, these tests were distributed as follows: Regular Army reorganization camp, Syracuse, N. Y., 738; Regular Army and National Guard, Fort Benjamin Harrison, Indianapolis, Ind., 898; National Guard camp, Nashville, Tenn., 734; Naval Training Base No. 6, Brooklyn, N. Y., 759; institutions for mental defectives, 372; total, 3,501. Illiterates were not excluded.

SECTION 1.—*Group examination a.*

Tests 1, 2, 4, 5, 8, and 9 were scored "number right" (the number of correct items); tests 3, 6, 7 and 10 were scored "right minus wrong" (the number of correct items less the number of wrong items). This plan had been tentatively formulated by the committee after the Vineland experiment with 400 subjects. Total scores were found by counting each way from a tentative median (counted as zero) and summing the values—a method which yields both positive and negative scores. It was believed that different tests would be of different importance in making up the total score, and that, therefore, before summing up the scores of the separate tests, these scores should be multiplied by proper weights. The weighting keys, tabulated herewith, show the weighted score corresponding to any actual gross score.

Weighting key for tests of examination a.

Test 1 (number right).		Test 2 (number right).		Test 3 (right minus wrong).				Test 4 (number right).	
Gross.	Weighted.	Gross.	Weighted.	Gross.	Weighted.	Gross.	Weighted.	Gross.	Weighted.
0	−18	0	−12	0	−14	11	+ 8	0	−27
1	−15	1	−10	1	−12	12	+10	1	−24
2	−12	2	− 8	2	−10	13	+12	2	−21
3	− 9	3	− 6	3	− 8	14	+14	3	−18
4	− 6	4	− 4	4	− 6	15	+16	4	−15
5	− 3	5	− 2	5	− 4	16	+18	5	−12
6	0	6	0	6	− 2	17	+20	6	− 9
7	+ 3	7	+ 2	7	0	18	+22	7	− 6
8	+ 6	8	+ 4	8	+ 2	19	+24	8	− 3
9	+ 9	9	+ 6	9	+ 4	20	+26	9	0
10	+12	10	+ 8	10	+ 6			10	+ 3
		11	+10					11	+ 6
		12	+12					12	+ 9
								13	+12
								14	+15
								15	+18
								16	+21
								17	+24
								18	+27
								19	+30
								20	+33

Weighting key for tests of examination a—Continued.

Test 5 (number right).				Test 6 (right minus wrong).				Test 7 (right minus wrong).	
Gross.	Weighted.	Gross.	Weighted.	Gross.	Weighted.	Gross.	Weighted.	Gross.	Weighted.
0	−50	21	− 8	0	−15	21	+ 6	0	−12
1	−48	22	− 6	1	−14	22	+ 7	1	− 9
2	−46	23	− 4	2	−13	23	+ 8	2	− 6
3	−44	24	− 2	3	−12	24	+ 9	3	− 3
4	−42	25	0	4	−11	25	+10	4	0
5	−40	26	+ 2	5	−10	26	+11	5	+ 3
6	−38	27	+ 4	6	− 9	27	+12	6	+ 6
7	−36	28	+ 6	7	− 8	28	+13	7	+ 9
8	−34	29	+ 8	8	− 7	29	+14	8	+12
9	−32	30	+10	9	− 6	30	+15	9	+15
10	−30	31	+12	10	− 5	31	+16	10	+18
11	−28	32	+14	11	− 4	32	+17		
12	−26	33	+16	12	− 3	33	+18		
13	−24	34	+18	13	− 2	34	+19		
14	−22	35	+20	14	− 1	35	+20		
15	−20	36	+22	15	0	36	+21		
16	−18	37	+24	16	+ 1	37	+22		
17	−16	38	+26	17	+ 2	38	+23		
18	−14	39	+28	18	+ 3	39	+24		
19	−12	40	+30	19	+ 4	40	+25		
20	−10			20	+ 5				

Test 8 (number right).		Test 9 (number right).				Test 10 (right minus wrong).			
Gross.	Weighted.	Gross.	Weighted.	Gross.	Weighted.	Gross.	Weighted.	Gross.	Weighted.
0	−10	0	−10	21	+11	0	−20	21	+ 1
1	− 8	1	− 9	22	+12	1	−19	22	+ 2
2	− 6	2	− 8	23	+13	2	−18	23	+ 3
3	− 4	3	− 7	24	+14	3	−17	24	+ 4
4	− 2	4	− 6	25	+15	4	−16	25	+ 5
5	0	5	− 5	26	+16	5	−15	26	+ 6
6	+ 2	6	− 4	27	+17	6	−14	27	+ 7
7	+ 4	7	− 3	28	+18	7	−13	28	+ 8
8	+ 6	8	− 2	29	+19	8	−12	29	+ 9
9	+ 8	9	− 1	30	+20	9	−11	30	+10
10	+10	10	0	31	+21	10	−10	31	+11
11	+12	11	+ 1	32	+22	11	− 9	32	+12
12	+14	12	+ 2	33	+23	12	− 8	33	+13
13	+16	13	+ 3	34	+24	13	− 7	34	+14
14	+18	14	+ 4	35	+25	14	− 6	35	+15
15	+20	15	+ 5	36	+26	15	− 5	36	+16
		16	+ 6	37	+27	16	− 4	37	+17
		17	+ 7	38	+28	17	− 3	38	+18
		18	+ 8	39	+29	18	− 2	39	+19
		19	+ 9	40	+30	19	− 1	40	+20
		20	+10			20	0		

It will be observed that the use of weighting keys has the effect of weighting the tests as follows (named in order from test 1 to test 10): 3, 2, 2, 3, 2, 1, 3, 2, 1, 1. These weights were recommended by Thorndike on the following grounds: (1) The combined opinions of a dozen psychologists as to the relative weight to be attached to the tests; (2) a rough estimate of the variabilities of the tests; and (3) a rough estimate of their inter-correlations. At that time no data on correlations with officers' ratings were available. By the method of scoring and weighting used, the total score ranged from +226 to −188.

The distributions of scores for various groups are shown in table 1.

TABLE 1.—*Distributions of scores for various groups.*

Scores.	Syracuse (Regular).	Indianapolis (Regulars and National Guard).	Nashville (National Guard).	Brooklyn (Mosquito Fleet).	Totals for all stations.	Adult defectives (159).	Regular Army literates (346).	Students in officers' training camp (50).	Students of psychology (87).
+220				1	1				
+200					[illegible]				
−180				8	8				1
+160	1	1	1	16	19			2	13
+140	2	6	1	43	[illegible]		1	4	17
+120	[illegible]	11	11	68	95		3	9	15
+100	[illegible]	4	17	92	121		4	10	17
+80	[illegible]	29	22	101	15[illegible]		6	7	15
−[illegible]	16	26	40	93	175		7	7	4
−[illegible]	[illegible]	40	43	69	178		14	4	1
+20	24	51	39	81	195		20	3	1
0 to [illegible]	[illegible]	63	64	52	225	1	22	3	
0 to [illegible]	[illegible]	71	63	48	242	3	30		
−20	[illegible]	105	86	35	316	7	50		
−[illegible]	52	109	66	24	251	9	43		
−[illegible]	59	104	57	24	244	12	41		
−[illegible]	57	104	47	6	214	12	43		
−100	[illegible]	[illegible]	40	4	169	21	31		
−120	74	55	50	1	180	24	29		
−140	46	24	47	2	119	33	1		
−160	70	21	34	1	126	28	1		
−180	42	5	6		53	17			
Total	[illegible]	898	734	769	3,139	167	[illegible]	50	87
Median	−73	−47	−35	+88	−26	−135	−47	+102	+127
Lower quartile	−133	[illegible]	−97	+18	−87	−162	−89	−67	+101
Upper quartile	[illegible]	−18	+17	+108	−22	[illegible]	−6	−127	+154

The score distributions above are such as would be expected if the tests were reasonably valid measures of general intelligence. Officers and university students on the one hand, and feeble-minded subjects on the other, make scores which deviate widely from the scores of enlisted men.

Another indication of the validity of the tests is the correlations between scores and officers' ratings of their men for intelligence. Such ratings were secured by E. K. Strong for 313 men of three national guard companies. The correlations of these ratings with the separate tests were as follows:

Test.	Correlation with officers' rating.	Probable error.	Test.	Correlation with officers' rating.	Probable error.
1. Oral directions	0.47	0.019	6. Synonym—antonym	0.51	0.017
2. Memory span	.34	.032	7. Practical judgment	.41	.029
3. Disarranged sentences	.48	.018	8. Number series completion	.42	.013
4. Arithmetical problems	.46	.024	9. Analogies	.36	.048
5. Information	.54	.036	10. Number comparison	.47	.016

For single brief tests (time limits, 1 to 5 minutes) the above correlations must be regarded as very satisfactory. The correlations are fairly uniform except for the appreciably lower coefficients for tests 2 and 9, and the relatively high coefficients for tests 5 and 6. Correlations between officers' ratings and total score in the ten tests were obtained for groups in each of the four stations. The correlations were as follows:[1] Syracuse, 218 cases, r=.5; Brooklyn, 168 cases, r=.2; Indiana (excluding officers' training camp), 634 cases, r=.3; Nashville, 770 cases, r=.65; officers' training camp, 113 cases, r=.15.

The methods by which the officers' ratings were made, their reliablilty as indicated by correlations between ratings of the same men by two or more officers, and the tabular data from which the correlations were derived were not reported by the statistical unit. Thorndike states, relative to these data:

For enlisted men the general tendency is thus to a correlation of 0.5. I should think it safe to assume that the score in the group-test when given twice, once with short and once with abundant time, would correlate with an omniscient

[1] This statement calls for the following comment: The coefficient of correlation between ratings and tests depends upon the heterogeneity of the group in question. The low correlation for officers' training camp groups is due largely to the fact that such groups are highly selected. The correlations between ratings and tests are low for any narrow-range group, whether superior, average, or inferior.

rating for general intelligence to the extent of nearly 0.7, in the case of the lower half of the National Army. For higher grades the test is not so useful. The low correlations in the Brooklyn, and Officers' Training Camp groups show this. Also the correlation with marks attained by aviators in the studies of the ground school is under 0.3.[1]

Table 2 shows the inter-correlations of the ten tests for 313 National Guard men.

TABLE 2.—*The intercorrelations of the 10 tests for a group of 313 enlisted men.*

[Table shows coefficients of correlation (r) and their P. E.'s.]

Test.	1	2	3	4	5	6	7	8	9	10	Average of 9 r's.
1		0.53±0.014	0.56±0.040	0.61±0.005	0.64±0.010	0.62±0.044	0.58±0.016	0.49±0.014	0.55±0.026	0.57±0.011	0.58
2	0.53	.....	.43± .018	.55± .025	.56± .015	.47± .013	.48± .028	.39± .030	.37± .044	.50± .025	.47
3	.56	.43	.....	.59± .015	.65± .019	.67± .016	.49± .038	.45± .021	.54± .005	.55± .043	.54
4	.61	.55	.59	.....	.72± .026	.66± .026	.62± .024	.60± .018	.58± .037	.56± .039	.61
5	.64	.56	.65	.72	.....	.75± .010	.63± .033	.51± .026	.62± .051	.66± .022	.64
6	.62	.47	.67	.66	.75	.....	.62± .025	.55± .011	.61± .042	.53± .025	.61
7	.58	.48	.49	.62	.63	.62	.....	.45± .051	.61± .039	.53± .028	.56
8	.49	.39	.45	.60	.51	.55	.45	.....	.57± .067	.41± .004	.49
9	.55	.37	.54	.58	.62	.61	.61	.54	.....	.45± .058	.54
10	.57	.50	.45	.56	.66	.53	.53	.41	.45	.....	.52

The last column in table 2 shows the average correlation of a test with the other nine tests. These averages all fall between 0.47 and 0.64. Only those for tests 2 and 8 are as low as 0.50 and only those for tests 4, 5, and 6 are as high as 0.60. A test which failed to show a fairly high average correlation with intelligence tests picked by competent judges would probably not be worth much as a measure of intelligence. On the other hand, if a test correlated almost perfectly with some other test in the battery, it could be omitted without loss. Accordingly, the intercorrelations of the tests and their correlations with officers' ratings are important in determining the proper weight to be given to the separate tests.

The following is quoted from Thorndike's report as chief of the statistical unit in the initial experiment with the group examination:

The group test is to be used to prophesy the mental ability which a man will display in the Army. Our best attainable measure of that is the rating for mental ability given to men by their company commanders. If any one of the 10 tests correlates zero with officers' ratings, it deserves zero weight in the composite score used for the prophecy. If it correlates highly it deserves much weight, other things being equal. The other things to be equal are its correlations with the other nine tests. The general principle is that the lower it correlates with them, the greater weight it should have in the composite. For, in proportion as two tests intercorrelate closely, they are repetitive—i. e., are measures of the same fact—and a high weight to each of them will mean an undue weighting of the same fact. The lower the correlation of this fact with the fact to be prophesied, the more excessive would the weighting be.

A fair approximation to the weighting discoverable by a full treatment of partial correlation coefficients and a fully derived regression equation may then be secured by simply observing which tests correlate relatively closely with officers' ratings and relatively little with other tests of the 10.

The facts secured by us in the case of companies C, D, and L of the National Guard (tested by E. K. Strong in July and August) justify these conclusions: (1) That any convenient weighting of the 10 tests will give a prophecy not much inferior to that obtained from the best possible weighting. (2) That any convenient system for giving tests 2, 7, and 9 less, and test 3 more weight than the others will improve the prophecy. The correlations of each test with the officers' ratings and the averages of its nine correlations with the other nine tests are as shown in table A. The points of importance may be still better seen by expressing the facts of table A as differences from the average correlation as is done in table B. Thus test 1 is seen to be somewhat above the average in closeness of correlation with the officers' ratings, but also to be somewhat too repetitive of the other tests. It is intrinsically a good symptom of mental ability in the Army, but its contribution is in large measure contained in or duplicative of the other nine tests. Test 2 is not intrinsically a very good symptom of mental ability, but it does have the merit of contributing a good deal that the other nine tests do not include. Test 3 is above the average of the 10 tests in its closeness of correlation with officers' ratings; it also is less repetitive of the other nine than the average. So it is clearly a test to be given extra weight.

[1] The conventional letter "r" is used in this report to represent a coefficient of correlation. A probable error is designated by "P. E."

TABLE A.

Test.	Average of correlations with other 9 tests.	Correlation with officers' ratings.	Test.	Average of correlations with other 9 tests.	Correlation with officers' ratings.
1	0.58	0.47	6	0.61	0.51
2	.47	.34	7	.56	.41
3	.54	.48	8	.49	.42
4	.61	.46	9	.54	.36
5	.64	.54	10	.52	.47

TABLE B.—*Differences of each test from the average of the 10.*

Test.	In closeness of correlation with the other 9 tests.	In closeness of correlation with officers' ratings.	Multiplier.	S. D. of National Guard group (313).	Resulting relative weight.	Test.	In closeness of correlation with the other 9 tests.	In closeness of correlation with officers' ratings.	Multiplier.	S. D. of National Guard group (313).	Resulting relative weight.
1	−0.02	+0.02	3	2.6	78	6	+0.05	+0.06	1	9.9	99
2	− .09	− .12	2	2.5	75	7		− .04	3	2.7	81
3	− .02	+ .03	2	5.4	108	8	− .07	− .03	2	3.8	76
4	+ .05	+ .01	3	3.9	117	9	− .02	− .09	1	10.5	105
5	+ .08	+ .09	2	10.3	206	10	− .04	+ .02	1	9.3	93

In our opinion it is doubtful whether any change is worth while beyond changing the multipliers for tests 4 and 5 from 3 and 2 to 2 and 1, respectively. It would probably aid the prophecy somewhat to use 4 and 3 instead of 3 and 2 for tests 1 and 2, respectively, but this means larger numbers to be added. The too high weight of test 9 can not be reduced properly without adding much to the task of transmuting the scores.

However, the tests all intercorrelate so closely that the revised weighting would not produce a much better result. It might raise the correlation from 0.50 to 0.55 and lower the probable error from 0.15 to 0.14.

Retests were made of 380 individuals for the purpose of determining the probable error of the score. The facts are as follows:

Regular Army	76 cases, P. E. = 11 points.
Brooklyn group	127 cases, P. E. = 19 points.
Feeble-minded	40 cases, P. E, = 9 points.
Delinquent women	50 cases, P. E. = 16 points.
Graduate students	87 cases, P. E. = 6 points.

Thorndike summarizes these results by saying:

The P. E. of one 45-minute trial with the test seems to be about 15 points. The judgment from a man's score should be thought of as fairly safely within the limits of 30 up and 30 down, and as almost certainly within the limits of 60 up and 60 down. These determinations include the effects of changing interest, attitude, and the like. If a man really does his best the P. E. will be much lower, say not over 10.

The correlation between total score in the test and reported length of schooling was found to be as shown in table 3. Only records bearing English or Irish names were used. Thorndike comments as follows:

The correlation (0.67) would be higher if perfect measures of educational advantages instead of mere reports of grades were recorded, and if four or five tests instead of one had been used, probably about 0.75. Even so, it is clear that the test does not measure simply amount of schooling. Since length of schooling is itself caused in part by inborn ability, I think it fair to claim that a man's difference from his fellows in the test is determined as much by inherent ability as by circumstances. This inherent ability is, however, obviously specialized for words, numbers, and other abstract and symbolic content. Hence the need for tests of ability with things and people before deciding the fate of a recruit.

TABLE 3.—*Reported amount of schooling in successive years.* (*E, elementary grade; H, high school; C, college.*)

Total score in the group test.	E1.	E2.	E3.	E4.	E5.	E6.	E7.	E8 or 9.	H1.	H2.	H3.	H4.	C1.	C2.	C3.	C4.
+190											1					
+180									1							1
+170											1	3	1	1		
+160							1				4		1	2	1	1
+150					1		1	1			1	1		2		7
+140										3		1	1	3	1	1
+130								1	1	2	5	6	3	2		5
+120								3	3	3	1	2	5	5	1	5
+110								3	1	2	6	7	2	2		4
+100						1	1	2	6	5	7	9	1	4		3
+ 90								7	4	5		2	1	5	4	4
+ 80						1	3	9	5	3	8	14		1	2	1
+ 70								7	4	10	7	6	4	[illegible]	3	4
+ 60				1			2	3	9	7	9	10	2	4	1	1
+ 50					4	1	4	17	8	12	5	9	3		1	
+ 40		1			3	1	2	9	6	7	7	3		1		
+ 30				1	1	4	4	15	5	14	3	2	1			
+ 20		1				5	3	13	7	11	3	4		2	2	
+ 10					1	2	7	28	5	5	5	2	2		1	
0 to +9					2	4	7	18	8	6	2	3	3			1
0 to −9		1		1	8	8	6	22	5	3		8		3		
− 10			1	1	9	10	4	8	5	7	3	1				
− 20		1	1	8	9	7	11	19	7	4		2		1	1	1
− 30				4	9	6	11	18	5	6	1	1	1		1	
− 40		3	2	4	5	8	9	22	4		1	1	2			
− 50			4	2	11	6	14	14	2	4	1					
− 60		1	1	4	13	7	10	12	4		1		1		1	
− 70	2	2	1	3	10	11	6	9		2	2					
− 80		1	6	1	14	11	4	4		2	1					
− 90	1	2	4	4	6	2	8	5			1					
−100			2	4	7	2	3	1	1	1						
−110		1	3	2	11	2	1	5		1		1				
−120	2		5	[illegible]	1	1	3	1	1	1						
−130			1	9	10	3		1								
−140		2	4	3	5	3	2	1								
−150	1		2	2	2	1	2	2								
−160	1	4	4	4				2								
−170		1	3	2	1		1				1					
−180	2	2						1								

The total score in the group test (for men with English or Irish names) correlates with reported amount of schooling $0.67 \pm .015$.

Forms A, B, and C of the Vineland group examination were used in all four camps. Form D was used in all except Syracuse, and form E in all except Brooklyn. In comparing the score distributions for the purpose of determining the relative difficulty of the five forms it was necessary, because of selective factors affecting camps, to treat the four camps separately. Since only 700 to 900 men were tested in a camp, the number for any one form was too small to allow anything like an exact determination of the relative difficulty of the forms. The indications were that the differences were negligible except for a slightly greater difficulty of form B. The data were summarized by Thorndike as follows:

> Form B is harder than form A by 13 points ± 1.7; form C, equal in difficulty to A: (difference of 0.2 points ± 0.1); form D, substantially equal to A: (difference of 3.2 points ± 1.6); form E, substantially equal to A: (difference of 2.5 points ± 1.2).

As far as the results can be accepted as representative, they confirm the validity of the "random selection" method of Wells for making up the separate forms.

It had been expected that the results of the experiment would make it possible to rearrange the items of all the tests in order of difficulty, from easiest to hardest. However, the data were not satisfactory for this purpose, because the time limits allotted to the tests had prevented the majority of the men examined from reaching the most difficult items in the case of tests 3 to 10. The items of test 2 were already in order of difficulty, and in the case of test 1 the order is not as vital as it is for the majority of the tests.

On the relation of total score to salary earned, Thorndike reported as follows:

> The relation of score in the test to reported salary earned at a given age by men engaged in the same trade is of interest, but our data do not permit rigorous treatment. The relation when different trades are mixed is negative for young ages; positive for older ages. That is, a young man scoring low in the tests reports earning more per week than a man of equal age who scores high. This reverses somewhere around age 27. This is, of course, more or less what one would expect.

Concerning the interpretation of total score, the following is quoted from Thorndike's report:

Adult inmates of feeble-minded asylums, of Binet ages 9 to 13, in general make in the test scores from −188 to −60. Their median score is −140.

Men of the Regular Army reporting themselves as "laborers" or "farmers," who have English names and report at least some schooling, in general make scores from −100 to 0. The median score of 100 such taken at random is −55.

Men of the Regular Army (including a few from officers' training camps) who have English names and some schooling and who report themselves as skilled laborers, such as electricians, engineers, draughtsmen, carpenters, masons, photographers, and the like, make in general scores from −70 to +50. The median score of 53 such is −15.

Fifty men in training in an officers' training camp made scores from 0 to +180, with a median a trifle over +100.

Eighty-seven students in a course in psychology primarily for seniors and graduate students made scores from +50 to +175, with a median at about +125.

Four hundred and fifty men of the Regular Army (camp in Indiana) showed only 16 men, or 35 per thousand, with scores of −140 or worse; and there is evidence that at least half of those men (below −140) could read English very little or not at all.

There is evidence that if a man can read English as well as, say, the average fifth-grade child, and still scores below −140 in the test, he either is not admitted, or, if admitted, is not found worth retaining in the Regular Army.

It seems, then, that any literate man who scores below −140 should be considered for exclusion from the Army, or for retention only for work in which even gross stupidity could not endanger his fellow soldiers. A man scoring −100 should be subjected to further study, especially by the aid of performance tests (clock, maze, form board, and Stenquist) in a group test, and by tests of his ability to manage himself and other men so as to gain fair repute amongst his associates.

At the other end of the scale it may be said that no man scoring below zero is likely to succeed in the work with books, maps, instruments, and the like of a training camp for commissioned officers. Such a man probably should not be sent there, as he will almost certainly fail. Roughly, a minimum standard of +50 might be set for admission to such a camp, with character, leadership, and military zeal and knowledge the deciding factors for men scoring +50 or better.

More systematically we may interpret the scores as shown below (assuming that the individual speaks English well and has had good opportunity to learn to read English):

−150 feeble-minded adult, of Binet age, 9 to 10.
−100 upper level of the "border line" or the lower level of the dull, slow-thinking day laborer.
− 50 unskilled laborer.
0.
+ 50 lower level of men fit for appointment as officers.
+100 level of a man who gains success in a profession or as an officer in the Army or the Navy by intellect.
+150 level of a very rapid and exact thinker with words, numbers, and abstract relations.

For the purposes of the Army the abstract ability measured by the test above +100 may well be irrelevant, but from +100 down the scores certainly have value. This is proved by the correlation with the officers' ratings of the ability and promise of the men. This correlation averages about 0.5. It seems likely that with an omniscient judgment of the intellect of a man the score in the test would correlate with that judgment to the extent of 0.7 or 0.8 (assuming, as previously, that the test is used with men who have had good opportunities to learn to speak and read English).

At the four examining stations individual examinations were given to between 200 and 300 men. It appears that only 50 of these tests were scored. This obviously is entirely too small a number either for purposes of standardization or for important statistical treatment. The only results reported by the statistical unit are the following correlations (Pearson coefficients as estimated by method of unlike signs) with ratings of men by their officers.

Test.	Item correlated.	r.	Test.	Item correlated.	r.
Cube construction:			Form board	Time	0.19
Part a	Time	0.34	Digits backward	Number correct.	.34
Part b	do	.22			
Part c	do	.29	Absurdities	do	.46
Part d	do	.22	Likenesses and differences	do	.19
Part e	do	.06	Designs	Score points.	.13
Part a	Moves	.25			
Part b	do	.03	Logical memory	Memories.	.06
Clock test	Number correct.	.43	Comprehension	Number correct.	.00
Cube imitation	do	.43			
Maze test	Time	.40	Arithmetical reasoning	do	.06
Do	Error	.40	Code	do	.31

The data treated were scanty and the method of correlation rough. Nothing was reported about the nature of the distributions of the ratings and scores from which the correlations were computed. Without such data the correlation coefficients themselves have little significance.

On August 15 a joint conference of the Committee on Methods for the Psychological Examination of Recruits and the staffs of the various units which had conducted the unofficial trial of the tests was called at Columbia University.

Thorndike informally reported the findings of the statistical unit which had analyzed the data of examination. These findings have been set forth briefly in the preceding pages. The examiners present reported their impressions and suggested improvements in method. The members of the conference agreed that the group method of examination had demonstrated its usefulness. Thorndike pronounced it incomparably the best battery of group tests that had ever been assembled. Examiners reported that it attracted and held the interest of the men, and that groups of 80 could be tested as easily as groups of 40. The methods of individual examination were less fully reported upon, but the general opinion seemed to be that the tests devised for this purpose would prove satisfactory after they had been further standardized.

On recommendation of Thorndike provision was made for the supplementation of the group method by (1) a literacy test (the Thorndike reading scale) to be used to eliminate from the group test all men who were not literate enough to be fairly measured by a test involving printed symbols; (2) a performance test (the Stenquist construction test) to be given to men who had failed to pass the literacy test; (3) for those who passed the literacy test but who nevertheless made low scores in the group intelligence test, it was provided that the latter be repeated with greatly extended time.

It was generally agreed that the proportion of soldiers who were too nearly illiterate to be justly measured by the regular group test was so large that not all could be given an individual examination. It was believed that many such recruits could be passed as satisfactory on the basis of a group performance test, thus reducing considerably the necessary number of individual examinations. On recommendation of Thorndike the Stenquist mechanical skill test was accepted for this purpose.

In view of the fact that the Stenquist test was very early abandoned, it should be stated that the members of the conference were by no means certain that it was suited to the purpose. It was adopted for trial because no other group performance test was available and time was lacking for devising a new one. This decision seemed to make necessary some form of literacy test which, by indicating at once those too illiterate to be rated by the regular group test, would prevent needless duplication of examinations. Terman was designated to modify the Thorndike reading scale (visual vocabulary scale) for this purpose. The modification was to involve a reduction of the test to bring it within the necessary time limits.

The purpose of repeating the group intelligence examination with extended time in the case of men making low scores was to reduce still further the number of individual examinations. It was believed that this would be accomplished both by the reduction of the probable error and by the elimination of the speed factor. Thorndike suggested that the repeated examination include all the tests except 1 and 2, and that the time allowance for each be approximately doubled. Terman was designated to prepare the necessary directions.

SECTION 2.—*Group examination b.*

It will be recalled that examination *b* was merely the repetition, with extended time, of tests 3 to 9, inclusive of examination *a*. It was thought that such repetition in the case of all who scored below 100 points[1] (i. e., below C) in examination *a* was desirable for the following reasons: (1) That it would give a fairer measure for men whose low scores in the first examination were due to slowness of reaction rather than to real inferiority of intelligence; (2) that apart from the factor of speed, the repetition of the test would considerably reduce the probable error of the score.

It is unnecessary to consider at length the justification for these expectations. The repeated test was very objectionable for practical reasons. From 11.5 per cent (Camp Devens) to 31.8 per cent (Camp Lee) of those who took examination *a* fell below the score 100. To recall so many men for an additional group examination disturbed the training program to such an

[1] This score value is stated in terms of the revised method of scoring described on page 325. See also page 421.

extent as to create grave prejudice among commanding officers against the work. Besides, it was the general opinion of the psychological examiners that the benefits derived from the repeated examination were small in comparison with the time and labor involved. At Camp Devens only men who had made a score of less than 70 on examination *a* were recalled for examination *b*. Those who made a total weighted score on examination *b* of 70 (tests 1 and 2 omitted) were passed without individual examination. This saved nearly half of the individual examinations, but whether it furnished a more reliable measure of the subject's intelligence than examination *a* is doubtful.

The probable error of a score secured by giving the group examination twice on different days and averaging the results is undoubtedly somewhat less than the probable error of a score resulting from a single test. The latter is not far from 10 points, weighted score, for examination *a*. This is only about one-eighth of the standard deviation of the distribution of scores for unselected literate men. Repeating the test might conceivably reduce the probable error to one-ninth or one-tenth of the standard deviation, but the practical gain for Army purposes would not be worth the time and labor required.

As a means of favoring the exceptionally slow, repetition of the examination with extended time was wholly disappointing. (See p. 480f.) An investigation at Camp Lee showed that, while on the whole there was a slight gain in score with extended time, the relative standing of a man was not often materially altered. For example, examination *a* given twice to a group of 51 unselected men gave a correlation of 0.943. The correlation of examination *a* with examination *b* for 380 unselected men was but little less—namely, 0.913. The data from more than 500 men in seven companies who took both the *a* and *b* examinations indicated that the relation of a man's score in *b* to his score in *a* was more influenced by the use of different "forms" in the two examinations than by the difference in time limits. The facts are as follows:

Groups given examinations *a* and *b*.	Form used in examination *a*.	Form used in examination *b*.	Average gain or loss.
Three groups, 203 men	C	E	5 points, gain.
Two groups, 200 men	C	D	For one group, 1 point gain; for one group, 1 point loss.
One group, 63 men	E	A	24 points, gain.
One group	B	E	11.5 points, loss.

It is shown elsewhere (p. 338) that an extension of time sufficient to permit 50 per cent of the men to complete each test (instead of the usual 5 or 10 per cent) does not decrease appreciably the percentage of zero scores for most of the tests; also that doubling the time allotment does not demonstrably improve the correlation of the tests with officers' ratings of men or with Binet mental age in the case of school children (p. 339). The expectation that many men of fair intelligence would make low scores in examination *a* because of slow mental processes looked reasonable enough, but it is not borne out by the facts.

Section 3.—*Group test for illiterates—Stenquist.*

The Stenquist test was given to 14,610 men during the initial experiment in four cantonments. It was far from satisfactory, but it was regularly used because nothing else was available for the group examination of illiterates and foreigners. The chief objection to it was its low value as a measure of intelligence. Even with unselected literate men it correlated with examination *a* only to the extent of 0.45 to 0.55. Its correlations with officers' ratings of their men were very much lower than this, usually not more than 0.20 or 0.30. The letter grades which it yielded, therefore, were not comparable with those based upon examination *a*. The following data bearing on the validity of the Stenquist test were received from the camps:

Camp Taylor, 109 men, unselected group, r for examination *a* and Stenquist, 0.323.

Camp Devens, 107 men, foreign eliminated, but largely inferior cases, r for examination *a* and Stenquist, 0.35. Same group, r for examination *a* and abbreviated Stenquist (consisting of alternate items), 0.32.

Camp Lee, 76 unselected men, r for examination *a* and Stenquist, 0.30. For the 30 men of this group whose scores in examination *a* were below 50 the correlation with Stenquist was 0.00.

Camp Dix, 909 men of the Three hundred and third Engineers, unselected, r for examination *a* and Stenquist, 0.510 (see table 4). The same men were also given an improvised group examination consisting of five tests, among which were the designs test, a digit-symbol test, and a maze test. Although these required only three to six minutes each, their correlations with examination *a* were, respectively, 0.54, 0.77, and 0.46. For another group of 69 unselected men at Camp Dix the correlation between examination *a* and Stenquist was 0.62.

Camp Lee, 17 men who had fallen below 100 in examination *a*, correlation between Stenquist and officers' estimates, was 0.20. The correlation between Stenquist and mental age for 216 men who had been given an individual examination was practically zero. (See table 5).

Camp Dix examiners gave the Stenquist test to 40 inmates of a New Jersey State colony for the feeble-minded. Five earned scores above 50. The mental ages of these ranged from 7.5 to 11 years. Other subjects of the mental ages 8 and 9 made 0 to 5 points.

Camp Devens reported tests of 48 inmates of the Massachusetts School for the Feeble-minded, Waverly. The correlation between Stenquist score and mental age by the method of rank differences was only 0.32. Three-fourths of these subjects earned scores as high as 48, and one subject, of mental age 8.6, the score of 80. The same 48 subjects were also given test 2 (memory for digits) and test 4 (arithmetical reasoning) of examination *a* and test Q (designs) from the individual examination series. The combined score of these, given as a group test, gave a correlation of 0.65 with mental age, twice as high as that for Stenquist and mental age.

The above correlations are so low that the Stenquist test can not be considered a satisfactory test of general intelligence. For two groups of 179 and 107 unselected men the correlation between the complete and abbreviated Stenquist (items A, B, D, E, and I) was 0.77 and 0.84, respectively. The correlation of one half with the other half would necessarily be somewhat less than this. A reliability coefficient less than 0.90 is unsatisfactory.

The correlation arrays of tables 4 and 5 are typical of the low correlations found for Stenquist and examination *a*.

TABLE 4.—*Relation of Stenquist scores to examination a scores (r.=0.510).*

Examination *a* score.	Stenquist skill score.																									
	0–4	5–8	9–12	13–16	17–20	21–24	25–28	29–32	33–36	37–40	41–44	45–48	49–52	53–56	57–60	61–64	65–68	69–72	73–76	77–80	81–84	85–88	89–92	93–96	97–100	
381—																						1	1	1		3
361—												2				1	1		1			1		3	2	11
341—			1									1				2	2	1	2			1	1		1	12
321—													2	1		1	1	1	4	6	5	2		2	4	29
301—				1				1				1	1	2		2	1	1	4	2	4	3	3	1	2	29
281—							2	1	2	1	1	1	5	1	2	1	2	4	1	2	2	1	4	3	6	42
261—					1		1					1	2	3	2	4	1	2	6	3	5	2	2	3	2	40
241—						1		2	2	1	1	4	3	5	1	2	1	4	7	4	6	4	3	3	1	55
221—									1	2	4	3	4		5	8	4	8	5	1	4	6	2		3	60
201—						2		3	3		1	3	4	1	4	10	6	7	7	5	3	5	5	2	2	73
181—						1	1	1		4	1		8	8	9	6	3	8	5	5	6	2	4	1	2	75
161—			1		2			2		2	6	7	4	7	5	5	7	8	9	5	5	5	2	2	2	86
141—		1		1			2	1	2	4	4	2	7	5	4	11	2	5	3	7	2	1	1	3	3	71
121—			1	1	2	4	1	3	6	4	3	5	8	4	6	1	4	2	4	3	1	1	1			65
101—		1	1		1	2	5	1	3	3	5	5	5	1	4	4	1	4	3		1	2	1			53
81—				1	1	1	2	1	3	4	2	3	4	4	3	3	1	2		1	1	2				35
61—				1	1	3	4	2	2	4	2	2		1	2	3	1			1	1	1	2			33
41—	1				1		2		1	6		4	2	2		3	2	2		2						28
21—			1			1	2	1	6	3	3	3	1	2	1	2		5	1							32
0–20—	3	3	3	5	6	5	1	6	5	10	3	1	5	7	5	6	1	1		1	1		1			77
Total.	4	5	8	10	15	18	23	25	36	48	36	48	61	54	53	75	41	65	62	48	47	40	33	24	30	909

TABLE 5.—*Relation of Stenquist scores to mental age, Camp Lee data (r.=0.128).*

Stenquist skillscore (short Stenquist).	Mental age.												
	4	5	6	7	8	9	10	11	12	13	14	15	Total.
43–45										1			1
40–42													0
37–39					1				1				2
34–36		1		2	1								4
31–33					1	1							2
28–30				2	2	1							5
25–27		1	2	2	3		1		2				11
22–24		1		2	1	1	2		2				9
19–21			1	4	3	4		1					13
16–18		1	2	3	4	2	2	1					15
13–15			2	3	4	6		1	1				17
10–12		1	2	7	6	7	4	1					28
7–9		1	7	6	11	7	3		1	1			37
4–6	1	1	11	13	12	7	4		1			1	51
0–3	1		5	4	4	4		1	1	1			21
Total	2	7	32	48	53	40	16	5	9	3	0	1	216

CHAPTER 3.

ACCEPTANCE OF METHODS BY THE WAR DEPARTMENT AND EARLY MODIFICATIONS RESULTING FROM OFFICIAL USE.

The methods prepared at Vineland, modified and supplemented in accordance with Thorndike's recommendations, were offered to the Surgeon General of the Army through the chairman of the Committee on Medicine and Hygiene of the National Research Council. The War Department promptly accepted the methods, and the Office of the Surgeon General initiated preparations for their official trial in military training camps.

Terman, who had been made a member of the Committee on Classification of Personnel in the Army and had been assigned by that committee to duty with the section of psychology, Office of the Surgeon General, devoted the larger part of his time from August 17 to September 28, to the revision of the Examiner's Guide along the lines suggested by the results of the unofficial trial. In this he was materially assisted by Yoakum, who, from the middle of August until the middle of September, also aided in perfecting arrangements for psychological work in the camps.

The Examiner's Guide, which was reprinted by the medical department, United States Army, in September, 1917, is reproduced on pages 123ff. Aside from minor details it differs from the original Guide, prepared by the committee at Vineland, only by reason of the following additions: (1) "Introductory explanations," page 123; (2) instructions for literacy test; (3) instructions for group intelligence examination *b*, pages 128–129 (the regular group examination now designated as group intelligence examination *a*, repeated with extended time for those who had made low scores in the first examination); (4) instructions for the group skill test (Stenquist construction, single series 1), pages 129–130; (5) instructions for Stenquist construction test for use in the individual examination (test F, p. 133); (6) instructions for scoring the Stenquist test, pages 146–147.

After certain preliminary experimental groups had been examined in the four cantonments, the method of scoring was changed by the elimination of negative scores. It was thought that the use of negative scores would increase clerical errors, and that they would also be misunderstood or misinterpreted. The provisional weights (pp. 313–314), however, were retained. The score now ranged from 0 to 414.

The following tentative interpretation of the scores for men able to read and write was suggested to examiners.

Range of scores.	Class.	Characterization.
300–414	Very superior	Intellectually competent to command (officer type).
250–299	Superior	
100–249	Average	Private type.
50–99	Inferior	Unskilled laborer
0–49	Very inferior	Probably intellectually defective.

It was decided to designate the above five groups as A, B, C, D, and E, respectively, and to report both the man's letter grade and his numercial score to the company commander. This system of letter grades was continued except for the addition in February, 1918, of the grades C+ and C−, and somewhat later, of D−. This classification certainly was not the most satisfactory that could have been devised. As it turned out, a scale of five grades proved to be too coarse. The addition of C+ and C− gave only seven grades. It would possibly have proved advantageous if a scale of ten equal steps had been used.

Various test blanks and the record and report forms used in the original four cantonments are shown on page 201ff.

From the beginning the methods proved themselves practicable. In general the examinations commanded the interest and respect of both men and officers. The feasibility of testing all recruits was demonsrated. Indeed, the expected rate of progress was considerably exceeded, due chiefly to the fact that it was found possible to examine men in much larger groups than had been planned for.

Certain shortcomings in the methods early became apparent: (1) The test which had been prepared for the segregation of illiterates proved to be unreliable and was abandoned after adequate trial. Various substitutes, to be described later, were tried. (2) The repetition of the main group examination with extended time (group examination *b*) was found to be administratively objectionable because of the difficulty of recalling men for repeated examination. Investigation also showed that group examination *b* added little, if anything, to the accuracy of the measure furnished by group examination *a*. It was early abandoned in all the camps except Devens, where it was given to about 650 men. (3) Chiefly because of lack of norms for the interpretation of scores, the methods prepared for individual examination proved unsatisfactory. Although used to a greater or less extent in all the camps throughout the initial experiment, they were in large measure superseded by the Yerkes-Bridges point scale, the Stanford-Binet scale, and the Pintner-Paterson performance tests. (4) The Stenquist test, although it proved to be of some value in reducing the number of individual examinations, was unsatisfactory because its results correlated so little with those of group examination *a* that it could not be regarded as a legitimate substitute for the latter.

Experimentation was early begun in all the camps looking toward the preparation of a more suitable group test for illiterates. Group examination *a*, on which the success of the army examining chiefly depended, was found to be satisfactory in all except minor details. It was used without modification throughout the official trial, but in January, 1918, it was revised by the elimination of two of the ten tests and by slight changes in several of the others. Its essential nature, however, was not altered.

CHAPTER 4.

REVISION OF GROUP EXAMINATION *a*.

Group examination *a* was notably successful from the beginning. It was interesting, relatively easy in administration, and for literate men yielded ratings which, in the judgment of those who had occasion to use them, were surprisingly dependable. It was this method chiefly which gave the psychological service its early prestige and paved the way for later developments.

However, during the trial period, as a result of special studies which had been made of this method of examination, a number of faults had become apparent. Of the 10 tests which composed the scale, some were found to give low correlations with other measures, some gave too large a proportion of zero or of perfect scores, some contained ambiguous items, some were improperly weighted. It was generally believed that the scale as a whole was rather less reliable for high-grade than for average men, and that the reliability at the lower extreme was also doubtful. As it was expected that a proposed new group test for illiterates would change the situation with respect to requirements to be satisfied by the group test for literates, revision of examination *a* was undertaken in connection with the general overhauling of methods in preparation for their extension to the entire Army.

Preparations for thorough revision of all the initial methods of examining were made by the staff of the Division of Psychology in December, 1917. In January, 1918, after the War Department had ordered the extension of examining, a group of psychologists on civil or military appointment was assembled in the Office of the Surgeon General for this special work.

The task naturally fell into three divisions—the revision of examination *a*; the provision of a substitute for the Stenquist group test as a test for illiterates, and the modification and supplementation of the methods of individual examining.

Capt. C. S. Yoakum, because of his intimate acquaintance with the conditions and results of examining in the camps, was placed in charge of the revision of examination *a*. He was assisted over a period of weeks by C. C. Brigham, Margaret V. Cobb, E. S. Jones, L. M. Terman, and G. M. Whipple. Some assistance was also rendered by the psychologists who, under the direction of Lieut. W. S. Foster, were engaged in developing a new group examination for illiterates. The group included C. R. Brown, A. S. Otis, K. T. Waugh, and R. H. Wheeler.

Terman and Whipple served as advisory members of the staff of the Division of Psychology. Data which proved extremely useful in connection with revision of methods were supplied by Terman and Haggerty as a result of the use of the Army mental tests in high schools and colleges. This supplementary examining was done by request of the Division of Psychology in order that age and grade norms might be made available and the validity of the methods measured for other than Army groups.

The data used for the revision included results of investigations along the following lines: (1) The value of the separate tests of the scale in differentiating officers from enlisted men, and enlisted men from the institutional feeble-minded. (2) Score distributions for various types of groups, both for the entire scale and for the separate tests. (3) Correlational material, including correlations of each test with officers' ratings of men; of each test with total score; of each test with Binet mental age, school grade, teachers' ratings, school marks, etc., in the case of school children. (4) The effect of changing the time limits. (5) Effects of different methods of scoring and weighting. (6) Relative difficulty of forms. (7) Objectionable items in the tests.

In order that the reader may be in position to compare the merits of examination *a* and its modified form alpha, the data upon which the revision was based will be set forth here in some detail.

SECTION 1.—*Differentiation between officers and enlisted men.*

One of the most striking indications of the validity of examination *a* as a whole was the large difference in median scores of officers and enlisted men. These differences are illustrated by the following figures:

Military group.	Number.	Median score.
Officers (all camps)	5,563	296
Officers' training camp students	16,798	269
Sergeants (Taylor)	196	232
Corporals (Taylor)	243	209
Enlisted men (all camps)	65.267	154

In order to disclose the relative value of the separate tests of examination *a* in differentiating between officers and men, the average scores of 300 American-born privates were compared with those of 703 officers. Table 6 gives the facts for comparison worked out at Camp Dix. The sixth column gives for each test the P. E. of the difference between means, and the next to the last column gives the ratio of the difference between means to the P. E. of this difference This ratio is not only an expression of the certainty of the difference between means, but may be taken as an index of the value of the test in differentiating between officers and men. The figures of the last column give the rank order value of the tests on this basis.

TABLE 6.—*Differentiation between officers and enlisted men by the separate tests of examination a.*

Test.	300 English privates, arithmetic, mean.	Standard deviation.	703 officers, arithmetic, mean.	Standard deviation.	P. E. of difference.	Ratio of difference to P. E. of difference.	Rank.
1	6.49	2.70	8.82	1.34	0.110	21.09	7
2	6.24	2.45	8.41	2.23	.111	19.58	8
3	7.66	6.39	14.44	4.48	.273	24.85	5
4	9.10	3.37	12.91	2.67	.147	25.83	4
5	23.49	8.81	32.24	4.91	.364	24.04	6
6	15.64	10.60	28.22	6.83	.448	28.08	2
7	4.25	2.63	5.57	2.24	.117	11.20	10
8	5.46	4.51	10.67	3.66	.198	26.31	3
9	12.35	10.47	25.67	9.21	.470	28.34	1
10	20.58	8.73	24.96	5.80	.370	11.85	9
Total	193.8	.....	292.27	.....	.....	[1] 22.12	.....

[1] Average ratio.

A similar comparison was made of 164 captains and 200 A or B men (Lee data) in order to find whether some of the tests excelled others in discriminating between officer material and privates having about the same intelligence. The results of this comparison are shown in table 7. It will be seen that the officers excel in tests 5 and 6, and A and B privates in tests 4, 7, and 10. The differences, however, are so small as to lack significance. It does not appear that the intelligence of officers differs qualitatively in any marked degree from that of A and B privates.

TABLE 7.—*Comparison of records of captains and A and B men in examination a.*

Test.	164 captains (Lee).		200 A and B men (Lee).		P. E. of difference.	Ratio of difference to P. E. of difference.[1]
	Mean.	S. D.	Mean.	S. D.		
1	9.00	1.48	8.91	1.37	0.096	0.99
2	8.93	2.22	8.93	1.91	.142	.0
3	14.29	5.40	14.14	4.40	.333	.42
4	13.00	6.00	14.0	2.34	.330	*3.10*
5	32.6	6.24	30.54	3.73	.348	5.64
6	29.7	7.78	27.9	6.96	.497	3.58
7	7.1	2.08	7.6	1.72	.129	*4.23*
8	10.88	4.04	11.2	3.46	.252	*.55*
9	25.5	10.80	25.7	7.96	.650	*.31*
10	25.3	6.44	26.5	6.16	.433	*2.82*

[1] Italics in the last column indicate that A and B men score higher than officers; roman type means that the difference is the other way.

SECTION 2.—*Differentiation between normal and feeble-minded persons.*

It is a well-known fact that the value of a test may vary greatly in the different ranges of intelligence. Table 8 shows the relative value of the tests in differentiating between privates and institutional feeble-minded subjects. It will be noted that in this table the rank order of the tests differs greatly from that in table 6. Test 7 has changed from poorest to best, the position of test 10 is greatly improved, and that of test 3 injured. The superiority of test 7 over all the other tests of the scale is marked, and the inferiority of test 3 even more so.

TABLE 8.—*Differentiation between privates and institutional feeble-minded subjects.*

Test.	97 institutional subjects.		300 English-speaking privates.		P. E. difference of means.	Ratio of difference to P. E. difference.	Rank.
	Mean.	S. D.	Mean.	S. D			
1	2.88	2.05	6.49	2.70	0.174	20.4	8
2	2.79	1.92	6.24	2.45	.161	22.6	6
3	2.82	3.57	7.66	6.39	.348	13.7	10
4	2.78	2.88	9.10	3.37	.236	26.8	2
5	9.90	6.56	23.49	8.81	.564	24.1	5
6	2.50	4.24	15.64	10.64	.505	26.0	3
7	.98	1.36	4.26	2.63	.109	32.8	1
8	1.03	1.67	5.46	4.51	.209	21.2	7
9	2.60	4.51	12.35	10.47	.511	19.1	9
10	6.00	6.93	20.58	8.73	.583	25.0	4

In this connection inquiry was made to find whether institutional subjects tend to make their score chiefly in certain tests. If this were the case it might then be possible so to manipulate the tests that these subjects would get a significantly lower score than the privates. The following figures show each test's percentage contribution to total weighted score in the case of 66 institutional feeble-minded (Vineland and Waverly) and 188 privates selected at random (Camp Dix):

Test	1	2	3	4	5	6	7	8	9	10
	Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
Feeble-minded	12	8	10	12	32	4	4	3	4	10
Privates	10	6	8	14	25	8	7	5	7	10

It is clear from this comparison that the institutional cases make a larger proportion of their total scores in test 5 than do privates.

Table 9 shows the percentage contribution of each test to total score in various ranges of intelligence:

TABLE 9.—*Percentage of contribution of each test to total weighted score.*

Test.	Privates (Lee).			703 officers.	Fort Snelling O. T. C. (836)	College freshmen: Minnesota.
	Score 25–99.	Score 100–249.	Score 250–414			
1	16.6	12.6	8.9	9.2	9.5	9.5
2	10.7	6.6	6.0	5.8	5.9	6.2
3	3.7	7.2	10.0	10.1	10.2	10.5
4	21.1	14.4	12.6	13.5	14.2	14.1
5	28.9	26.6	21.2	22.6	21.4	20.8
6	.....	7.2	8.3	9.8	12.8	9.9
7	.....	7.2	7.9	3.9	4.7	4.3
8	3.7	3.6	7.3	7.3	7.4	7.6
9	.....	3.6	8.3	9.0	8.0	8.9
10	14.6	11.0	8.3	8.7	8.1	8.0

Tests 1, 2, 4, 5, and 10 make a relatively larger contribution to total score with low than with high subjects, while the reverse holds for tests 3, 6, 7, 8, and 9. Although the above figures taken alone do not furnish a safe index of the relative value of the tests in the different

ranges, they agree in the main with the data already presented on the efficiency of the tests in differentiating officers from men and the latter from institutional feeble-minded subjects. There are certain exceptions, however. Tests 4 and 5 furnish a larger proportion of total score with low than with high men, yet are very valuable in the higher ranges. Test 7 contributes more to total score with high than with low subjects, yet has relatively low value in the higher ranges.[1]

SECTION 3.—*Proportion of zero and perfect scores.*

A large proportion of zero scores indicates either that a test is too difficult or that the instructions are not simple enough; a large proportion of perfect scores, that the test is probably not sufficiently difficult in the higher ranges of intelligence. Table 10 shows the per cent of zero and perfect scores for officers and unselected men.

TABLE 10.—*Per cent of zero and perfect scores made by officers and enlisted men.*

	Per cent of zero scores.		Per cent of perfect scores.	
Test.	921 unselected privates (Dix).	670 officers (Lee).	921 men, unselected (Dix).	1,051 officers (Dix).
	Per cent.	*Per cent,*	*Per cent.*	*Per cent.*
1.....	9.7	.....	8.4	34.5
2.....	8.0	.....	2.5	8.1
3.....	36.0	4.2	2.0	12.4
4.....	9.8	.1	.3	.5
5.....	13.1	.3	.3	.9
6.....	21.1	.4	1.1	4.1
7.....	27.8	.9	2.1	8.1
8.....	31.9	3.4	2.9	11.3
9.....	23.5	2.2	1.3	1.2
10....	12.2	.3	1.1	.6

The above table shows that for unselected men the per cent of zero scores is very low for tests 1, 2, and 4, low for 5 and 10, very high for 3 and 8, and rather high for 6, 8, and 9. Even officers often fail to score on tests 3, 8, and 9. Few privates make a perfect score on any except test 1, which for officers also is by far the easiest of the 10 tests. The fact that tests 3 and 8, which yield a high percentage of perfect scores, yield also an exceptionally high proportion of zero scores, indicates that the instructions for these two tests are confusing.

At Camp Lee 2,500 examination records (500 per each form) were tabulated to show the percentage of zero scores made in the different tests by unselected men at various levels of intelligence. The most important results are summarized in Table 11:

TABLE 11.—*Per cents, making zero scores at different levels of intelligence.*

Test.	Entire 2,500.	Men making—				
		50 to 74	75 to 99	100 to 149	150 to 199.	200 to 249.
3.....	38.1	60.0	45.0	35.0	18.0	6.4
9.....	36.0	65.7	49.4	30.0	12.0	.2
8.....	32.6	46.0	39.0	29.8	21.0	12.5
7.....	31.5	64.8	41.2	19.0	6.6	2.8
6.....	27.8	54.7	35.0	15.3	.3	.03
10....	12.6	17.5	9.8	4.4	.2	.00
2.....	10.0	15.6	10.2	3.1	2.0	.01
4.....	6.4	7.6	4.2	1.4	.05	.00
5.....	6.2	13.0	2.6	.05	.01	.00
1.....	5.7	5.7	2.0	1.4	.8	.04

[1] As indicated on page 341, test 7, as revised for the alpha examination, is a much better test than the original form. Part of this improvement is due to a change in scoring.

TABLE 12.—*Per cent of 920 unselected men (the Three hundred and third Engineers, Dix) who attempted one-fourth, one-half, three-fourths, or all of the items of each test, and per cent who succeeded.*

Test.	One-fourth.		One-half.		Three-fourths.		All.	
	Attempts.	Rights.	Attempts.	Rights.	Attempts.	Rights.	Attempts.	Rights.
1	80	.....	60	.....	35	.....	8	.....
2	85	.....	50	.....	15	.....	2	.....
3	70	47	49	27	24	10	8	1
4	87	80	62	40	7	4	1	0
5	83	79	62	49	31	17	6	0
6	74	54	47	25	16	8	2	0
7	80	60	49	29	17	8	5	1
8	72	48	53	27	32	13	12	2
9	66	37	39	19	15	6	2	0
10	89	79	68	41	17	6	2	0

Score distributions on the separate tests of examination *a* for various typical groups are shown on pages 534–536. Other material in Part II, chapter 11, also is of interest in a comparison of alpha and examination *a*.

SECTION 4.—*Correlations with officers' ratings of men.*

The only ratings available at the time were: (*a*) 313 National Guard men (same as on p. 315f); (*b*) 438 Lee draftees (averages for three companies taken separately); (*c*) 267 Lee subjects with total score above 100; (*d*) 362 Lee subjects with total score below 200; (*e*) 213 Fort Snelling officers' training camp students.

Table 13 gives the correlation of each test with ratings for the different groups. The ratings of Fort Snelling students were the intelligence ratings based on the officers' rating scale devised by Walter Dill Scott and later adopted for general use in the Army. The men of the other groups were rated by their officers as 1, 2, 3, 4, or 5 in general intelligence.

TABLE 13.—*Correlations between the different tests and officers' ratings of their men.*

Test.	313 National Guard.	438 Lee men.	267 Lee men above 100.	362 Lee men below 200.	213 officers' training camp students.
1	0.47	0.41	0.25	0.26	0.18
2	.33	.36	.24	.30	.02
3	.48	.30	.23	.15	.13
4	.16	.46	.34	.34	.13
5	.54	.45	.36	.32	.04
6	.51	.50	.40	.33	.03
7	.41	.39	.27	.24	.03
8	.42	.33	.29	.20	.06
9	.36	.43	.36	.29	.06
10	.47	.39	.35	.37	.01
Average	.45	.40	.31	.28	.07
Total score	.....	.57	.47	.47	.....

Some of the conclusions from table 13 are as follows. Test 2 on the whole is a poor test except in the lower range of intelligence. Test 3 is equivocal, giving a high correlation with National Guard cases and a low correlation with the Lee data. Tests 4, 5, and 6 are among the best tests. Test 10 is not far from average. The form of test 9, used with the National Guard cases, differed somewhat from that used later, and may explain its relatively low correlation in that group.

SECTION 5.—*Correlations with Stanford-Binet mental age.*

Correlations of the separate tests with Stanford-Binet mental age were available as indicated in table 14.

TABLE 14.—*Distribution of mental ages for groups used in correlating the tests of examination a with mental age.*

Group. No.	Cases.	Description.	Mental age distribution (Stanford-Binet.)													
			6	7	8	9	10	11	12	13	14	15	16	17	18	19
1.	70	School pupils chiefly retarded	.....	3	9	18	19	10	5	4	1	.....	1	.....	.....	.....
2.	88	First year high school pupils	.....	.....	.....	.....	.....	.....	.....	4	9	16	21	17	9	12
3.	60	Two sixth-grade classes			1	2	11	17	8	11	5	3	2	.....	.....	.....
4.	45	Miscellaneous pupils	.....	.....	.....	2	3	6	8	14	8	2	1	.....	1	.....
5.	107	Miscellaneous pupils (double time)	.....	.....	.....	7	22	22	13	14	6	6	9	6	.....	.....
6.	142	Reform School boys, Whittier, Calif.	2	2	9	15	20	28	24	17	13	7	3	1	0	1
7.	50	Feeble-minded, Sonoma, Calif., State home	.....	.....	.....	15	18	8	4	2	1	2	.....	.....	.....	.....
8.	256	Inmates, Indiana Reformatory (tested by Stone)	See table 18; distribution given by IQ.													

The data from all but the last group above were supplied by Terman and his students at Stanford University. For the most part the Binet tests had been given from one to two years previously, but the mental ages were brought down to date on the assumption that the ratio of mental age to actual age (intelligence quotient) remains constant. The Stanford data were based chiefly on form A of the army test, but in group 6 forms B and D were used. The procedure was regular except in the case of group 5, which had double time in tests 3 to 10. The correlations of the total score and of the separate tests with mental age are shown in Table 15.

TABLE 15.—*Correlations of total score and separate tests of examination a with mental age.*

Group.	Cases.	Test.										Total score.
		1	2	3	4	5	6	7	8	9	10	
1	70	0.55	0.37	0.48	0.71	0.62	0.73	0.58	0.49	0.72	0.58	0.82
2	88	.39	.44	.43	.50	.24	.68	.31	.46	.48	.03	.71
3	60	.33	.06	.35	.38	.51	.65	.33	.25	.38	.02	.66
4	45	.24	.46	.45	.50	.42	.45	.57	.10	.54	.40	.87
1 and 4[1]	313	.76	.31	.81	.79	.71	.86	.73	.72	.84	.61	.87
5	107	.61	.44	.52	.75	.62	.68	.66	.56	.76	.44	.88
6	142	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	.82
7	50	.25	.21	.31	.42	.43	.60	.51	.36	.42	.32	.58
8	256	.62	.56	.56	.66	.66	.74	.63	.52	.58	.49	.81

[1] Combined. [2] Not computed for separate tests.

The data of table 15 yield the values of rank order of the tests shown in table 16.

TABLE 16.—*Rank order of tests of examination a for different groups.*

Test.	Average r for groups 1 to 4.	Groups 1 to 4 combined.	Group 5 (extra time).	Feeble-minded group.	Reformatory group.	Sum of ranks.	Composite rank.
1	7	5	6	9	5	32	6
2	9	10	9.5	10	7.5	46	10
3	6	3	8	8	7.5	32.5	7
4	3	4	2	5.5	2.5	17	3
5	5	8	5	3.5	2.5	24	5
6	1	1	3	1	1	7	1
7	4	6	4	2	4	20	4
8	8	7	7	7	9	38	8
9	2	2	1	5.5	6	16.5	2
10	10	9	9.5	3.5	10	42	9

As a measure of the traits which enter into a Stanford-Binet mental age, test 6 is plainly by far the best test in examination *a*. Tests 9 and 4 rank next, 7 and 5 are intermediate, while 2 and 10 are decidedly lower.

Tables 16*a* to 19 give typical correlation arrays for Stanford-Binet mental age and total weighted score of examination *a*.

TABLE 16*a*.—*Total score, examination a (form A), and mental age—school children (r=.87).*

Stanford-Binet mental age.	Total score.																			Total.
	0–19	20–	40–	60–	80–	100–	120–	140–	160–	180–	200–	220–	240–	260–	280–	300–	320–	340–	360–	
19														1		4	4	2	1	12
18												4		2	4					10
17											1	2	4	5	3	2				17
16								1			4	8	5	4	2	1				25
15						2			1	1	5	5	4	2	3					23
14							2	4	1	6	7	3		1						24
13					1		2	12	4	12	4									35
12	1			1	2	3	6	5	2	2	2									25
11		1	4	1	5	6	6	10	3	3										41
10	3	3	6	4	12	8	9	2	4											51
9	5	8	8	8	2	3	1	2												37
8	2	6	2																	10
7	3																			3
6																				
Total	14	18	20	14	22	22	23	37	20	24	23	22	13	15	12	7	4	2	1	313

TABLE 17.—*Total score, examination a (forms B and D), and mental age—Whittier Reform School (r=.82).*

Stanford-Binet mental age.	Total score.																Total.
	0–19	20–	40–	60–	80–	100–	120–	140–	160–	180–	200–	220–	240–	260–	280–	300–	
19																1	1
18																	
17												1					1
16									1		2						3
15								2	2								4
14					1	1	5	1	3	2	2						15
13			1		1	5	4	2	1		1						15
12			1	1	6	8	4	4	3								27
11	1	3	2	7	4	2	4	4	1								28
10	5	4	4	2	5												20
9	2	7	3	2	1												15
8	2	5	1	1													9
7	2																2
6	2																2
Total	14	19	12	13	18	16	19	14	8	4	3	1				1	142

TABLE 18.—*Total score, examination a, and Stanford-Binet intelligence quotient—literate reformatory inmates, aged 21–30 (r=.81).*

Stanford-Binet I. Q.	Total score.															Total.
	0–24	25–	50–	75–	100–	125–	150–	175–	200–	225–	250–	275–	300–	325–	350–	
110–													1			1
105–									1			1			1	3
100–				1	1		1	3	3	6	2		3			20
95–					1		3	4	4	3						15
90–						1	3	5	6	1		1				17
85–				1	1	2	6	2	1	2						15
80–	1			1	3	5	6	3	4							23
75–		2	1	3	5	8	12	3								34
70–		1	3	9	13	7	3									36
65–	1	5	6	7	12	5	2	1								39
60–	1	7	8	7	8	3		1								35
55–	3	3	6	2	1											15
50–54	2	1														3
Total	8	19	24	31	45	31	36	22	19	12	2	2	4		1	256

TABLE 19.—*Total score, examination a, and mental age for feeble-minded* ($r=0.657$).

[Table includes following cases: Lapeer, 50; Sonoma, 46; Waverly, 46; Faribault, 31; Vineland, 20; total, 193.]

Mental age, various scales.	Total score.																					Total.
	0–9	10–	20–	30–	40–	50–	60–	70–	80–	90–	100–	110–	120–	130–	140–	150–	160–	170–	180–	190–	200–	
14													1									1
13																1			1		1	3
12							1		1			3	1	1								7
11		1		2	2		2	1	5	3	3	1	1	1	3	2						27
10	2	2	3	4	5	6	4	4	9	6	5	3	2	2		1	3		1	1		63
9	5	5	9	5	7	10	5	3	3	2	1	2										57
8	11	5	3	3			1			2												25
7	3	1	3		1																	8
6	2																					2
Total..	23	14	18	14	15	16	13	8	18	13	9	9	5	4	3	4	3		2	1	1	193

SECTION 6.—*Correlations with age.*

Each test was correlated with age for the 1,162 California pupils used in securing age norms from 8 to 16 years. The results were as follows:

Test	1	2	3	4	5	6	7	8	9	10	Total score.
r with age	0.50	0.33	0.52	0.61	0.65	0.61	0.53	0.43	0.61	0.61	0.70

Table 188 (Chapter 15) gives the age medians for the same data. It is certain that these are higher than would be found for white school children in general, for two reasons: (1) All children of foreign parentage were eliminated; (2) the cities in which the tests were made represented better than the average social and cultural conditions for the country as a whole.

SECTION 7.—*Correlations with schooling and with teachers' estimates.*

Correlation of total weighted score of examination *a* with school grade completed is ordinarily not far from 0.70 for unselected literate soldiers. In the correlation array shown on page 318 it is 0.67. Such comparisons are of course affected by the degree of accuracy with which school grade is reported. The true correlation would doubtless be somewhat higher than the figures given.

Table 20 gives the total score by school grade for 717 unselected children in the schools of Palo Alto, Calif. These included practically all the children enrolled in the grades above the third, in which only one class was tested. The correlation is 0.83. Norms for school grades, based on 4932 cases, are given on page 537, chapter 15.

TABLE 20.—*Total score, examination a, and school grade—Palo Alto children,* ($r=.83$).

School grade.	Total score.																			Total.
	0–19	20–	40	60–	80–	100–	120–	140–	160–	180–	200–	220–	240–	260–	280–	300–	320–	340–	360–	
12										3	1	3	7	17	6	8	5	2	1	54
11								1		1	4	11	9	10	10	12	2		1	61
10							1			3	6	15	10	11	9	7	3	2		67
9						1		1	5	12	18	18	17	13	11	2	2			100
8							1	7	10	12	11	15	11	5	2					74
7	1	1		1		2	8	15	11	22	14	7	3	1	1					87
6				1	5	7	9	21	11	8	3	4		1						71
5			1	6	7	11	19	14	8	5										71
4	2	3	11	27	21	17	16	3												100
3		5	12	3	6	2	3	1												32
Total																				717

The correlation between total score and school grade becomes still more significant when confined to unselected pupils of a given age. Such correlations were computed for boys and girls separately for each age from 11 to 15 in the case of the California school children of Ameri-

can parentage. In tables 21 and 22 the data are given for 13-year-old and 14-year-old pupils. In each the number includes all the pupils of American parentage of the given age, who were enrolled in the grades 4 to 9 of those schools in which all grades were tested. Certain schools in which not all the grades were tested were excluded from this comparison because it was desired to have the age groups as nearly representative as possible. However, there were probably a few pupils of these ages enrolled in the grades below the third. Such do not enter into this comparison.

TABLE 21.—*Total score examination a, and school grade—unselected 13-year-olds (r.=0.821).*

School grade.	Total score.															Total.
	0-19	20-	40-	60-	80-	100-	120-	140-	160-	180-	200-	220-	240-	260-	280-	
9a													1			1
9b								1			1	2	4	2	5	15
8a										1	3	1	2	1	1	12
8b							2	2	2	6	3	8	2	2		27
7a							1	3	6	3	7		1			21
7b				1		1	2	7	6	3	1					24
6a					1		4	3	2	2						12
6b				2	3		5	1								11
5a			1		1	2			1							5
5b			1	1						1						3
4a	1		2		1	1	1									6
4b		1		1												2
Total	1	1	4	5	6	4	15	17	17	16	18	11	10	8	6	139

TABLE 22.—*Total score, examination a, and school grade—unselected 14-year-olds (r.=0.860).*

School grade.	Total score.																	Total.
	0-19	20-	40-	60-	80-	100-	120-	140-	160-	180-	200-	220-	240-	260-	280-	300-	320-	
10a																		
10b												1	1	1	1	1	1	6
9a											1		1	1	2	2		7
9b										3	5	7	7	7	3	2		34
8a								1	1	2	6		2		1			13
8b								3	3	7	3	5	2					23
7a								3	1	2		2						8
7b					1		3	5	1	2	1							13
6a					1	3	1											5
6b			1		1	1	1	2										6
5a																		
5b			1	2	1		1											5
4a					1													1
4b			1															1
Total			3	2	5	4	6	14	6	16	16	15	13	9	7	5	1	122

These tables offer striking proof of the validity of examination *a* as a measure of educability. The pupils of a given age had had equal or approximately equal educational opportunity, and their distribution in the grades is due chiefly to differences in native mental ability. The correlations would probably be higher than they are but for certain constant errors in school grading. It is well known, for example, that the dull are usually over promoted and the bright under promoted, a fact which would tend to make the correlations lower than they should be. The data suggest strongly that the high correlation of total score and school grade in the case of soldiers is due, not to the influence of schooling on the test performance, but to the fact that the point at which children are eliminated from school is determined largely by ability. The correlations with grade location for the various ages are as follows:

Age.	Boys.	Girls.
11	0.75	0.79
12	.69	
13	.91	.74
14	.84	.81
15	.73	.74
Average	.78	.77

For the 87 13-year boys each test of examination *a* was correlated with grade location. The results were as follows:

Test	1	2	3	4	5	6	7	8	9	10	Total score.
Pearson r with school grade	0.49	0.40	0.56	0.67	0.70	0.66	0.58	0.61	0.76	0.55	0.91
Rank order of tests	9	10	7	3	2	4	6	5	1	8	.....

Teachers' ratings on intelligence for approximately 1,300 California children were correlated with examination *a*. The pupils of each room were rated by the teacher as very superior, superior, average, inferior, or very inferior in intelligence. These ratings were then compared, not with total score of examination *a*, but with the intelligence quotients. That is, mental age norms were worked out for examination *a*, and each child's intelligence quotient was ascertained by dividing his mental age score by his actual age. Had total score been used instead of intelligence quotient, it would have been necessary to confine each comparison to the children of a single school grade. The use of the intelligence quotient permits the grouping together of children of all ages and grades. The following correlations were computed (Pearson method):

School A, grades 3, 4, and 5 combined, r=0.55.

School B, grades 3, 4, 5, and 6 combined, r=0.67

School C, grades 4 to 8, combined, r=0.76.

School D, grade 4, r=0.57; grade 5, r=0.62; grade 6, r=0.61; grade 8, r=0.47.

School E, grade 2, r=0.31; grade 3, r=0.42; grade 4, r=0.65; grade 5, r=0.32; grade 6, r=0.24; grades 7 and 8 combined, r=0.29.

School F, grades 3 and 4, r=0.50; grades 5 and 6, r=0.59; grades 9 A and 10 B, r=0.49.

School G, grade 4, r=0.65; grade 5, r=0.58; grade 6, r=0.74; grade 7, r=0.63; grade 8, r=0.38.

School H, grade 3, r=0.42; grade 4, r=0.55; grades 5 and 6, r=0.51.

Comparing the agreement with teachers' estimates of intelligence in various school grades it appears that examination *a* is as valid a measure in the third and fourth grades as in the higher grades.

Correlations between total score in examination *a* and teachers' ratings on quality of school work were plotted for approximately forty classes. but were computed only for the following, which were selected as typical:

Grade	3	4	5	6	7	8	Average.
r=	0.25	0.33	0.51	0.65	0.32	0.54	0.463
r=	.....	.62	.43	.42	.66	.14	.494
r=	.....	.56	.54	.....	.....	.....	.55

Correlations between intelligence quotient for examination *a* and ratings on school work were computed as follows: Grade 2 (35 cases), r=0.17; grade 3 (155 cases), r=0.44; grades 3 and 4 combined (120 cases), r=0.42; grades 4 to 8 (107 cases), r=0.63. (For the same 107 cases, correlation between Stanford-Binet intelligence quotient and teachers' ratings was also 0.63).

For 84 Stanford University students of sophomore to senior grade, each test and total score were correlated with average class mark earned since university entrance. The results were as follows:

Test	1	2	3	4	5	6	7	8	9	10	Total score.
r=	0.15	0.00	0.22	0.23	0.06	0.24	0.15	0.23	0.25	0.24	0.31

For 167 senior normal-school students the correlation between total score and average class mark earned since entrance was 0.303, or practically the same as for university students.

For 494 high-school students the correlation between total score and average school mark was r = 0.343. For one group of 87 first-year and second-year high-school pupils this correlation was r = 0.36. (See p. 344 for comparison of examination *a* and alpha in this respect.) These 87 pupils had also been given a Stanford-Binet test, and the correlation between Stanford-Binet mental age and average school mark was r = 0.56, as compared with 0.36 for examination *a*.

SECTION 8.—*Correlations with other ratings and tests.*

Over 1,000 of the California pupils, grades 3 to 12, were rated by their teachers for (1) "dependability" (defined to include conscientiousness and obedience); (2) "social adaptability" (defined to include popularity and qualities of leadership); and (3) "power to give sustained attention." Correlations were computed for three schools as follows:

School group.	Number.	Dependability.	Social adaptability.	Sustained attention.
Grades 9 to 12 (high school)	300	0.20	0.10	0.22
Grades 4 to 8	391	.15	.29	.41
Do	320	.35	.27	.52

In one school 287 pupils, grades 4 to 8, were given the Trabue Completion Test, Forms B and C. The scores on the two Trabue forms were combined and correlated with the separate tests and with the total of examination *a*. The results were as follows:

Test	1	2	3	4	5	6	7	8	9	10	Total score.
r with Trabue	0.60	0.39	0.55	0.65	0.65	0.58	0.66	0.57	0.66	0.50	0.79

With the same pupils, r for total score with Stanford-Binet mental age was 0.72.

The Stanford data throwing light on the relative value of the separate tests include the following correlations:

Test	1	2	3	4	5	6	7	8	9	10	Total score.
Mental age, all Binet groups together	0.76	0.31	0.81	0.79	0.71	0.86	0.73	0.72	0.84	0.61	0.87
Rank order	5	10	3	4	8	1	6	7	2	9	.....
Trabue B and C	.60	.39	.55	.65	.65	.58	.66	.57	.66	.50	.79
Rank order	5	10	8	3.5	3.5	6	1.5	7	1.5	9	.....
Grade location, 13-year-olds	.49	.40	.56	.67	.70	.66	.58	.61	.76	.55	.91
Rank order	9	10	7	3	2	4	6	5	1	8	.....
Mental age, average r for Binet groups separately	.36	.31	.40	.50	.44	.62	.46	.33	.51	.27	.73
Rank order	7	9	6	3	5	1	4	8	2	10	.....
Age	.50	.33	.52	.61	.65	.61	.53	.43	.61	.61	.70
Rank order	8	10	7	3.5	1	3.5	6	9	3.5	3.5	.....
Average university mark	.15	.00	.22	.23	.06	.24	.15	.23	.25	.24	.31
Rank order	7.5	10	6	4.5	9	2.5	7.5	4.5	1	2.5	.....
r with mental age, double time allowed	.61	.44	.52	.75	.62	.68	.66	.56	.76	.44	.88
Rank order	6	9.5	8	2	5	3	4	7	1	9.5	.....

The correlations with age and with university marks are probably less significant than the others. Omitting these and computing a composite rank order from the other sets of correlations we have:

Test	1	2	3	4	5	6	7	8	9	10
Rank order	6.5	10	6.5	3	5	2	4	8	1	9

SECTION 9.—*Correlations with total score.*

Correlations of each test with total score had been made with inferior groups, unselected groups, amd superior groups. These are summarized on page 328ff. From the data there given it will be seen that the scale as a whole is in general best represented by tests 6, 9, 5, and 4, while test 2 shows distinctly the lowest correlation with total score. Tests 2 and 10 correlate relatively better with total score in the lower than in the higher ranges, while tests 3, 8, and 9 give higher correlations in the upper ranges.

The amount of such correlation is not due to a single cause and is subject to a variety of interpretations. Generally speaking, it may be said that the higher a test correlates with the total score of a battery of good tests, the better that test is when taken alone as a single measure. On the other hand, the objection to making up an intelligence scale out of tests which are all extremely highly intercorrelated is obvious, for in such a case the multiplication of tests beyond a very limited number becomes sheer waste. At the same time, low correlation of a given test with total score or with the other tests is not itself a recommendation for such test; it is the reverse unless it can be shown to correlate well with other measures of intelligence. The latter condition is one which must not be overlooked. A test which will not correlate fairly well with the total score of a good battery of tests is ipso facto under grave suspicion; there is little likelihood that it will consistently correlate well with any other proved measure of intelligence.

The average correlation of each test with the remaining tests is shown elsewhere for examination *a* and for alpha (p. 540ff). Tests 2, 8, and 10 are most unlike the other tests. In the higher ranges tests 3, 8, and 9 become more like, and tests 1 and 7 more unlike, the other tests. It will be seen that the tests of alpha give slightly higher intercorrelations than do those of examination *a*. It is, of course, possible that the committee on revision was too much influenced by the point of view expressed in the preceding paragraph, though data presented in chapter 11 show that the elimination of the two tests which yielded low correlations with the other tests did not, as far as could be determined, lower the correlations of the total score with outside measures.

SECTION 10.—*Time limits of the tests.*

Table 10 shows the distributions of zero and perfect scores, and table 12 certain data regarding attempts for each test in the case of 920 unselected men (Dix). Tests 3, 7, 8, and 9 are too difficult at the beginning. The most nearly normal distributions are given by tests 2, 4, 5, and 10.

Such facts, however, only indirectly throw light on the proper time limits of the tests. Certain data gained by the experimental lengthening of time limits have been set forth in chapter 2, and still more important results are set forth in chapter 9. The Lee experiment, in which the time of tests 3 to 10 was lengthened to allow 50 per cent of the unselected group to finish, showed that only in tests 3, 9, and 10 was the score appreciably increased. The correlations of the separate tests with total score were also little affected, as shown by the figures below. Here it should be recalled, time was not extended for tests 1 and 2. The differences found for these tests call in question the significance of the differences apparent in the other cases.

Test	1	2	3	4	5	6	7	8	9	10
Regular time	0.76	0.62	0.76	0.83	0.92	0.86	0.61	0.70	0.71	0.73
Extended time	.77	.70	.80	.88	.88	.83	.57	.75	.82	.70

The figures suggest that only test 9 would benefit considerably by extended time.

Terman gave double time on tests 3 and 10 in the case of one group of 107 school children who had been given the Stanford-Binet examination. The correlation of each test with mental

age was then compared with the average correlation for five other Binet groups in which regular time had been used. The following figures show the resulting changes in correlation coefficients:

Test	1	2	3	4	5	6	7	8	9	10	Total score.
Average r for five school groups (regular time)	0.36	0.31	0.40	0.50	0.44	0.62	0.46	0.33	0.51	0.27	0.73
Double-time group (tests 3 to 10)	.61	.44	.52	.76	.62	.68	.66	.56	.76	.44	.88
Per cent of increase	69	43	30	52	41	10	43	70	49	63	20

The correlations are all higher in the double-time group. That this was not due to the more liberal time allowance is made clear by the fact that tests 1 and 2, in which time was not extended, show as large increases as the others. The chief factor was the wider range of mental ability in the double-time group. A comparison of the percentage of increase in the correlations for the separate tests indicates that if any of the tests are improved by increase of time it is probably tests 4, 8, 9, and 10, and that if any are injured it is probably tests 6 and 3. On the whole the evidence does not suggest the desirability of any large changes in the time allotments for the tests. This is in harmony with the results set forth in chapter 9. Accordingly, only minor changes in timing were made.

Section 11.—*Methods of scoring and weighting.*

The chief questions in regard to scoring concerned the choice between the "number-right" method and the "right-minus-wrong" method. A study was made at Camp Lee, in which every test was correlated with total score by each method. In the case of the first four tests this was done for a group of 191 random cases, and in the case of the last six tests for a group of 70 randum cases. The results were as follows (correlation of each test with total score):

Test	1	2	3	4	5	6	7	8	9	10
Number-right method	0.76	0.62	0.66	0.84	0.90	0.76	0.81	0.74	0.79	0.70
Right-minus-wrong method	.61	.36	.72	.70	.81	.82	.79	.69	.70	.64

The results indicate that tests 3 and 6 are the only ones in which the right-minus-wrong method is better; in all the others, particularly tests 2 and 1, it is distinctly less satisfactory. Similar data collected at Camp Dix indicated a slight advantage of the right-minus-wrong method for test 3, no advantage for this method in the case of test 6, and a distinct superiority of the number-right method in the case of tests 7 and 10.

Terman tried both methods of scoring tests 7 and 10 with certain groups and found the following effects on correlations:

Group.	Nature of correlation.	Test 7.		Test 10.	
		Right.	Right minus wrong.	Right.	Right minus wrong.
1. 13-year boys	With grade location	0.72	0.58	0.63	0.55
2. Double-time group	With mental age	.62	.66	.22	.44
3. University students	With average mark	.08	.15	.33	.24
4. 1,100 unselected	With age	.59	.53	.66	.61

Here the comparison of most significance is that for the first group (r with grade location of unselected 13-year-old school boys) and it is seen that this distinctly favors the number right method. Group 2 indicates that with double time test 10 is better scored by the right-minus-wrong method.

On the whole, the evidence was thought to justify the elimination of the right-minus-wrong method for tests 7 and 10, and the retention of penalties for error only in the case of tests 3 and 6.

The question was raised whether weighting should not be abandoned. For an unselected group of 900 men at Camp Dix a correlation of 0.994 was found between total raw and total weighted scores. In the case of a more homogeneous group of 300 men at Camp Lee the correlation between total raw and total weighted scores was only 0.93. Correlations at Lee between officers' estimates and the two methods of scoring were as follows for three different groups:

Camp Lee groups	Battery 1.	Battery 2.	Battery 3.
Ratings by officers and weighted total	0.50	0.57	0.58
Ratings by officers and raw total	.53	.57	.54

With the same group the plan was tried of weighting only by halving the score of test 5 and doubling the scores of tests 6 and 9. The result was a slightly higher correlation with officers' ratings for each of the three batteries—53, 58, and 59, respectively.

It was generally agreed that the weighting system which had been used was at fault in allowing too much weight for tests 5 and 10, especially in the lower ranges, and too little weight for tests 6 and 9. Two methods were suggested whereby an individual's score would be defined in terms of its relation to the average score of an unselected group: (1) The percentile method and (2) multiples of the standard deviation. The former was rejected as unsound, since it would involve the averaging of percentiles to find a total score; the latter was rejected because of the difficulty incident to the use of the necessary conversion tables for translating raw scores into their weighted equivalents. It was finally decided to let the revision of weighting be determined after the revised scale had been given to a group of unselected men.

SECTION 12.—*Summary of modifications of examination "a" made in the construction of examination alpha.*

In the light of the data presented in the foregoing sections revision of examination *a* was undertaken along the following lines:

Test 1.—Changes: (1) The first item eliminated and three harder items added at the end. (2) Order of items altered to conform more strictly with the order of difficulty.

The test did not differentiate well between normal and feeble-minded subjects, as 20 per cent of the feeble-minded succeeded in four items or more. The test was more valuable in the middle ranges of intelligence. Too many officers made perfect scores. An additional reason for increase of items was to reduce the importance of chance errors due to distraction. The three additional items were prepared chiefly by Whipple and Otis. Remained test 1 of examination alpha.

Test 2.—Changes: It was decided to eliminate this test. It was found to correlate poorly with all other measures of intelligence, particularly in the data furnished by Terman. Its correlations with officers' estimates were also poor, except in the lower ranges, and it was thought that with a literacy test which would segregate all below fourth grade literacy for a beta examination, little value would be left for test 2. The difficulty of administration was also an objection to the test. It gave more opportunity for cheating than any other test of the scale and was time consuming both in giving and scoring.

Test 3.—Changes: (1) Instructions slightly altered in the direction of simplification. Easier samples were inserted. (2) Two much easier problems were substituted at the beginning of the test and enough harder problems of an abstract type were added at the end to make up a total of 24 items instead of 20. (3) Several sentences were eliminated or altered because of ambiguity. (4) All items were arranged in order of difficulty according to ratings made by the office force, and the items were equally distributed among the five forms according to difficulty.

The test is good in the upper ranges. The large number of zero scores, even with officers, indicates that the instructions were unsatisfactory. The addition of harder items and the simplification of instructions were intended to increase the value of the test both in the higher and in the lower ranges. Became test 5 of examination alpha.

Test 4.—Changes: Only minor changes were made in this test, and these had to do merely with the phrasing of certain items. Test 4 showed exceptional evenness of difficulty among the five forms. Became test 2 of examination alpha.

Test 5.—Changes: (1) About 15 of the easiest items were eliminated from each form and an equal number of difficult items were added at the lower end. (2) The test was altered in such a way as to bring an equal number of each type of item (historical, literary, scientific, etc.) into each form. (3) It was decided to print the response words in heavy-faced type.

This test contributed too much to total score, especially in the lower ranges. Ability to succeed in the first 10 or 15 items seemed to depend more on reading ability than on information. Too many officers were able to complete the test (20 per cent). There was marked difference in the difficulty of forms. Became test 8 of examination alpha.

Test 6.—Changes: (1) Two easier items were added at the beginning of the test and five harder items toward the end in each form; enough eliminations were made to leave the total number as before. (2) Attempt was made to rearrange the items in order of difficulty on the basis of examination records of a random group of privates. (3) A few items were shifted from one form to another in order to equalize difficulty of the forms.

The test yielded too large a percentage of zero scores, but in all other respects was one of the best tests of the scale. Became test 4 of examination alpha.

Test 7.—Changes: (1) The test was extended from 10 items to 16 items. (2) The number of alternative responses was reduced from four to three for each item by eliminating in each case that one which had least often been checked. (3) The scoring was changed from right-minus-wrong to number right. (4) Several unsatisfactory items were eliminated or altered. (5) Several more difficult items were included. (6) The items were graded in difficulty on the basis of estimates made by the office force and were distributed so as to equalize the difficulty of the test in the five forms. Became test 3 of examination alpha.

As it stood, the test was not long enough and the score was too much dependent upon speed of reading. The elimination of the most absurd alternative response reduced the amount of reading without altering the judgment factor appreciably. The increase in the number of items reduced the factor of chance error in adjustment and improved the test in the higher ranges.

Test 8.—Changes: (1) The instructions were revised so as to include more samples. The statement of instructions was also simplified with the view to having the subject understand the task through concrete illustration. (2) The subject is required to write two additional numbers instead of one for each item, the purpose being to insure that a correct response indicates a complete understanding of the problem. (3) Time extended from two to three minutes. (4) The number of items was changed from 15 to 20. The first items are intended to be easier than those of examination *a* and those at the end of the test very much harder. (5) Effort was made to equalize the difficulty of the test in the various forms by systematic inclusion, in each form, of the same types of problems. Became test 6 of examination alpha.

This test proved of greatest value with officers, but the distribution of scores was unsatisfactory. As it stood, the test was too much of the "all or none" type. The addition of both easier and harder items was made to eliminate this defect.

Test 9.—Changes: (1) The instructions were simplified by the elimination of free associations in the incorrect alternative responses of the first two samples. The correct answer was thus made more obvious. (2) The first items in each form were made somwehat easier in order to reduce the number of zero scores. (3) Some items were shifted from one form to another in order to equalize the difficulty of forms. (4) Several objectionable items were altered. (5) Items were arranged in the order of difficulty according to the examination records of a random group of privates. Became test 7 of examiation alpha.

Test 10.—This test was eliminated. Like test 2 it was found to correlate very poorly with Stanford-Binet mental age and with other measures. It counted too much in the make-up of the total score. It was of little value in the higher ranges of intelligence and was time consuming.

It was agreed by the committee that test 2 and test 10 both had their chief value in the lowest ranges of intelligence. The plans for the new beta examination were expected to provide for those below fourth-grade literacy and probably for all earning grades below C in the alpha examination. For this reason it was not considered as important that the alpha examination should give accurate ratings in the lower ranges as that it should differentiate well in the higher ranges. The most serious faults of examination *a* were in the higher ranges. Its revision was guided by the belief that the new scale should allow the best individuals to distinguish themselves from those of moderate ability.

It will be seen that the changes as described above were in the main not radical, except for the elimination of test 2 and test 10. The time limits were not greatly altered. While the time for test 8 was increased from 2 minutes to 3 minutes, and that of test 7 from 1 minute to 1½ minutes, both of these tests were lengthened almost enough to offset the increase of time. The time of test 5 was increased from 3 minutes to 4 minutes partly because the test was made more difficult and partly in order to leave the subjects with the the feeling that they had not been too much hurried. (This test was changed from fifth in the series to last.) The new order of the tests was as follows: Test 1, following directions; test 2, arithmetical reasoning; test 3, practical judgment; test 4, synonym-antonym; test 5, disarranged sentences; test 6, number series completion; test 7, analogies; test 8, information.

SECTION 13.—*The alpha examination.*

After revision, examination *a* was called alpha to distinguish it alike from examination *a* and from examination beta for illiterates. It was put into operation immediately and was retained until the close of the war as the group examination for literates. Between April 1 and December 1, 1918, it was given to approximately 1,250,000 men.

It was decided to weight the alpha tests according to the variability of their scores, and, if possible, in such a way as to make the total score comparable to that of examination *a*. The measure of variability used was the interquartile range.

Table 23 shows for two groups of unselected men and one group of officers the interquartile range for each test, the weights adopted, and the effects of the weighting.

TABLE 23.—*Interquartile range of tests at three camps.*

Test.	Weights.	421 men, Camp Meade.		400 men, Camp Meigs.		400 officers, Camp Gordon.	
		Raw.	Weighted.	Raw.	Weighted.	Raw.	Weighted.
1. Directions	3	5	15	4	12	2	6
2. Arithmetical reasoning	3	5	15	4	12	5	15
3. Practical judgment	3	5	15	5	12	4½	13½
4. Synonym-antonym	2	14	28	12	24	11	22
5. Disarranged sentences	2	6	12	8	16	8	16
6. Number series	3	6½	19½	4	12	4	12
7. Analogies	1	11	11	12	12	17	17
8. Information	1	16	16	14	14	10	10

After weighting, the variabilities of the tests are fairly well equalized except for test 4 (synonym-antonym), which is properly given extra value. The total score is 412, as compared with 414 of examination *a*.

The only changes later made in the alpha examination were the elimination or alteration of unsatisfactory items and the elimination of weighting. The latter was provided for by an order to the camps. The correlation of 0.993 between raw and weighted total (for 2,856 unselected men), together with the large amount of time required for weighting the scores, unquestionably justified the substitution of raw for weighted scores. The various bases on which letter ratings were assigned are set forth elsewhere (p. 421 ff). Values of the coefficient of correlation between raw and weighted scores for examination *a* and for alpha are shown below. Table 24 gives a scatter diagram between alpha raw and alpha weighted.

EXAMINATION *a*.

Camp.	Group.	Number of cases.	r.
Dix	Three hundred and third engineers	935	0.994
Dix		285	.994

EXAMINATION ALPHA.

Camp.	Group.	Number of cases.	r.
Custer	June draft	551	0.988
Dix	April draft		.993
Greenleaf		400	.988
Meigs	Motor mechanics	400	.992
Wheeler	Dixie division, June increment, Illinois and Michigan	7,029	.984
Nine camps	Unselected draft	653	.994

For use in the Student Army Training Corps the directions for giving the alpha tests were simplified as shown, pages 200 to 201. The change allowed the examinee to get the problem merely by reading the directions at the top of the page, the examiner not reading them for him except in the case of tests 1 and 7. All the tests except 1 and 7 received an additional time allotment of ten seconds for compensation. This simplification of procedure was deemed advisable because of the plan of the Committee on Education and Special Training to have the tests given in Student's Army Training Corps units by members of the local faculties.

TABLE 24.—*Correlation between alpha weighted and raw total scores (r=0.994).*

Alpha raw score.	Alpha weighted score. 0–9	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100–109	110–119	120–129	130–139	140–149	150–159	160–169	170–179	180–189	190–199	200–209	210–219	220–229	230–239	240–249	250–259	260–269	270–279	280–289	290–299	300–309	310–319	320–329	330–339	340–349	350–359
180																																			1	1
175																																	1			
170																																				
165																																	1			
160																																3	1			
155																														1	2					
150																																				
145																											1	1	2	1						
140																											1	3	1							
135																											2	5								
130																									1	4	4	1								
125																								1	4	2										
120																							2	3	[illegible]		1									
115																							2	2	2											
110																						4	2	4	2											
105																				1	1	5	1													
100																				2	5	2	1													
95																			1	9	3															
90																		5	10	7	2															
85																		6	7		2															
80															1	4	8	5	3																	
75															4	14	11	4																		
70															4	6	4																			
65												2	3	11	6	2																				
60												1	10	15	3																					
55												7	13	4																						
50										2	7	6	4																							
45									3	4	9	3																								
40							1	2	6	12	3																									
35							2	8	13	6																										
30						3	10	16	3																											
25					1	17	10	8																												
20				4	12	15	2																													
15			3	10	9	2																														
10			21	15																																
5	1	22	10																																	
0–4	40	9																																		

Some of the effects of the revision can be seen from a comparison of the score distributions for the alpha tests in the case of 987 unselected recruits from 9 camps with the score distributions of the corresponding tests of examination *a* for the Three hundred and third Engineers, Dix. These two groups were of nearly the same size. Total scores and the scores on the test of arithmetical reasoning (which was left practically unchanged in the revision) indicate that the Dix group was a considerably higher grade group than the other—a fact which should be borne in mind in comparing the score distributions of the tests. The Dix group contains an

entire regiment except for 45 men who did not make a single point on any test. The only elimination from the other group was of those born in non-English speaking countries. Comparison of the score distributions for the two groups brings out the following:

"Oral directions" was made harder, as was intended, and the distribution curve was greatly improved. In "practical judgment" the proportion of zero scores was very greatly reduced and the distribution improved. The synonym-antonym test appears not to have improved. The introduction of five harder items at the end was of doubtful value, and the excessive number of zero scores shows that the effort should have gone rather to improvement of instructions and to the substitution of easier items at the beginning. The distribution of scores for "disarranged sentences" was materially improved, but the number of zero scores is still too large. "Number series" was made very much better. Its present form yields far fewer zero scores, and the form of distribution curve is also improved. The attempt to simplify the instructions for the analogies test was not particularly successful, as the distribution for the revised form is practically the same as before. As was intended, the information test was made harder, but without increasing materially the number of zero scores. Data presented elsewhere indicate that "number series" and "practical judgment" were especially improved by the revision.

Tables 25 and 26 give an opportunity to compare the merits of examination *a* and alpha as indices of a pupil's probable success in high-school classes. The pupils of both groups were enrolled in the first year of high school. The groups were tested under equally favorable conditions and the higher correlation shown by table 26 seems to indicate a decided superiority of alpha over examination *a* for this purpose. The correlation in table 26 (0.455) is equivalent to a much higher correlation in a wider-range group.

TABLE 25.—*Correlation of raw total of examination (a) with average class mark of 494 California high-school pupils* (r=0.343).

Average class mark.	Total raw score, examination *a*.													Total.
	30–44	45–59	60–74	75–89	90–104	105–119	120–134	135–149	150–164	165–179	180–194	195–209	210 or over.	
1					3	2	2	3	1	6	6	4	2	34
2					5	9	18	24	22	24	8	4		114
3		1		2	9	28	41	46	30	13	9	3		182
4		1		3	9	19	19	19	19	7	2			98
5			2	3	4	14	11	11	7	1	1			54
6				1	1	4	1	1	2	1				11
7								1						1
Total		2	2	9	31	76	92	105	86	52	26	11	2	494

TABLE 26.—*Correlation of alpha score with average class mark of 480 California high-school pupils (not the same pupils as in Table 25)* (r=0.455).

Average class mark.	Total raw score (Alpha).													Total.
	30–44	45–59	60–74	75–89	90–104	105–119	120–134	135–149	150–164	165–179	180–194	195–209	210 or over.	
1				3	3	15	12	9	9	3	2			56
2				8	17	15	24	13	6	5	1			89
3			4	6	22	21	20	10	5	1				89
4			7	25	33	23	10	7	4					109
5		4	10	18	14	22	12	1	1					82
6	1	3	3	12	7	8	8	1						43
7			2	5	3	1	1							12
Total	1	7	26	77	99	105	87	41	25	9	3			480

The most important criticisms of alpha are: (1) That it is less effective than examination *a* in the lower ranges of intelligence, and (2) that it is made up of tests too highly intercorrelated. The first criticism is answered by the fact that alpha was not intended to serve as a measure of low-grade men, since it was planned that all who made low scores in alpha would be required

to take the beta examination. As for the second criticism, it is true that the intercorrelations of the alpha tests are slightly higher than the tests of examination *a*. It is probably also true that the number of alpha tests could be reduced to four or five without serious loss. On the other hand, this is not an argument against the elimination of the two tests which had nothing to commend them except low correlations with the other tests. As shown on page 452, examination *a* correlates as well with officers' estimates when tests 2 and 10 are not counted in the total as when they are.

Doubtless alpha could be improved. Many of its items are unsatisfactory and for no test are they arranged in order of difficulty. Some of the tests are rather too hard for average enlisted men. It is possible that 12 or 14 briefer serial tests, requiring in all about the same time as the present 8, would be more effective. It is also possible that three or four of the best alpha tests combined with three or four of the best beta tests would be appreciably better than either alpha or beta alone. It is practically certain that alpha can not be greatly improved by extending it along similar lines or by giving a second form of the test at the same sitting. It is even doubtful whether a much better measure would be secured by averaging the results of two or three repetitions of the tests at different sittings. It is also unlikely that any great improvement will be accomplished by changes in time allowance or the method of scoring. It is probable that improvement should rather be sought in the more effective combinations of alpha tests with other tests of somewhat different nature, perhaps with "omnibus" tests involving more frequent change of problem.

121435—21——23

CHAPTER 5.

METHODS OF SEGREGATION.

SECTION 1.—*Literacy tests.*

The unofficial trial of examination *a* demonstrated that a large proportion of the soldiers could not properly be given the group psychological examination because of their inability to read English. In August, therefore, the committee in charge recommended that this examination be supplemented by the Stenquist mechanical test. In January, 1918, the beta examination was substituted for the Stenquist. Some sort of segregation of examinees into groups of the relatively literate and relatively illiterate was consequently necessary. To insure the individual an opportunity to secure the highest grade of which he was capable, as well as to make possible a comparison between groups, an accurate and uniform method of segregation was required.

Modified Thorndike test.—For this purpose a modification of Thorndike's Reading Scale, Word Knowledge or Visual Vocabulary,[1] was prepared by Terman. The modification consisted in the following: Changes in instructions to make them applicable to larger groups; reduction of the time limit from an indefinite period to 3 minutes; elimination of the preliminary test; reduction of the categories from eight to four; omission of the lines of test words suited for the odd-numbered and half-year grades; and reduction of the number of test words in each grade from 10 to 5. Four forms of this "Literacy test" were printed and distributed to the four original camps. These forms, together with the directions and rules for scoring, are reproduced on pages 279–280.

Various unforeseen objections to the method of segregation as outlined arose almost immediately. The tentative norms and the insruction to retain only men of fourth-grade literacy or better set far too high a standard. Camp Devens, for instance, reported a group where men of literacy grade 2 or below had been allowed to take examination *a*; 37 per cent made a grade of C or better. Camp Dix reported that, in an average group of 307 men, 35 per cent scored zero and 16 per cent more scored second grade in the test; thus 51 per cent were excluded from examination *a*. In another group of 222 cases, selected to secure a random sample, 32 per cent scored zero and 20 per cent second grade, leaving 52 per cent "illiterates" for the Stenquist test. From a study of other large and typical groups it appeared that 19 per cent of the men who scored zero in the literacy test secured grade C or better in examination *a*, and of the men scoring second grade in the literacy test, 78 per cent made grade C or better in examination *a*. The median score for men of second-grade literacy was 137.5; the lower quartile, 106.5. The test correlates with soldiers' reported school grade about 0.68.

Further evidence that the norms originally furnished to the examiners were too high appears in Table 27. The first line of the table proper is an interpretation of the norms originally furnished to the examiners, expressed in terms of the number of words correctly marked. The second line of the table shows the averages and probable errors, by grades, of correctly marked words in a typical study of 313 cases at Camp Dix. Grade in this latter case is the grade as reported by the soldier.

TABLE 27. *Norms for the modified Thorndike literacy test.*

Grade	1	2	3	4	5	6	7	8	High school.
Interpretation of norms: Items correct	.....	3–5	.....	6–7	.....	8–12	.....	13–17	18–20
Average of items correct ± P. E.	0.1±.05	0.0	0.66±.18	1.12±.32	2.15±.34	2.23±.27	3.07±.27	4.38±.23	7.52±.42

[1] Teachers' College Record, vol. 15, 1914, pp. 207–220; vol. 17, 1916, pp. 431–433.

This great difference may have been due in part to the fact that men of the lower degrees of literacy did not comprehend what they were called upon to do, because of the elimination from the instructions of the preliminary demonstration series used by Thorndike.[1] Camp Dix reported marked decrease in the number of zero scores when a blackboard demonstration, involving properly marked sample words, preceded the actual test. However, a new modification of the Thorndike test by Kelley, which retained the trial series, was little more successful than the first modification.

Success in the test implies ability to hold in mind four different tasks. The test is therefore one which by nature is too much of an intelligence test. Reduction of the task to the single one of "writing the letter A under every word that means an animal," greatly reduced the percentage of zero scores. This simplification of the task, added to the blackboard demonstration, reduced the percentage of zero scores to 13.5 per cent in a typical group. Less than 5 per cent of those making zero scores in this case secured a grade as high as C in examination *a*. The major objection to the test was, however, purely practical. It required at least 10 minutes of the examining hour and the services of three orderlies for a group of 100 men to pass out literacy blanks, give the examination, collect the papers, make immediate segregation of individuals, and to send the illiterates from the room. Thereafter, to make possible a report of literacy, it required the services of two of the orderlies during the remainder of the hour to score and grade the literacy papers.

Kelley's literacy test.—These latter objections apply in particular to another modification of the Thorndike test, which was arranged by T. L. Kelley under the direction of Thorndike. This was intended to make good the faults of the earlier modification. It contained 60 instead of 20 items, and was preceded by a demonstrations. serie The form of test and the directions are presented on pages 280 and 281 of Part I. It was tried out at Camps Lee, Dix, and Devens. It proved even more time-consuming and cumbersome than the original modification and gave no promise of greater practical advantage. One examiner who gave it strictly according to directions reported that it took 45 minutes and created much confusion in the examining room. Its standard also was too high. In one group of 330 men 146 would, by the instructions, have been excluded from examination *a*. This test was, therefore, not used after the preliminary trials.

Segregation test.—At several of the camps it was concluded that a means of merely segregating groups (not a means of measuring the grade of literacy of individuals) might be all that was required. Thus at Camp Dix a dictation test was developed and used during a large part of the fall examining. The subjects were given slips of paper and were told, first to write their names, and then to write on a slip of paper the sentence "We are in the army." Thirty seconds were allowed for writing the name and 45 seconds for writing the sentence. Orderlies then inspected the slips scoring the individual "literate" or "illiterate." Those who wrote the sentence legibly with even approximately correct or phonetic spelling were held for examination *a*. Two orderlies were able to divide a group of 100 into two appropriate groups in about six minutes. It is reported in a study of 433 cases that 9.5 per cent failed the test. Of those who failed 2 per cent received a grade as high as C; of those who succeeded about 25 per cent received grades as low as E and 17 per cent grades as low as D in examination *a*.

At Camp Devens another simple test for segregation was tried with a few groups. A cardboard screen was provided, in which was cut an oblong horizontal opening, and upon which were drawn simple figures: a ship, a shoe, a flag, a face, etc., with the directions, "With your finger touch the ———." The sentence was completed by an appropriate word which appeared in the horizontal opening at the will of the examiner, who rotated a cardboard disk behind the screen. The examinees passed in single file and were directed to examination *a* or to the Stenquist, according as they obeyed instructions or not. The method proved rapid but unreliable. Some men of low-grade literacy read the instructions aloud without apparently grasping the idea that they were really to obey them. Others simply imitated those who preceded them in line without apparently reading the instructions at all. The method was abandoned without further attempt to improve it.

[1] Op. cit. 15, pp. 211, 219.

Devens literacy test.—In an attempt to develop a literacy test, the problem of which could be readily grasped by men of low literacy and which would nevertheless measure a degree of literacy over a wide range, another form of test was developed at Camp Devens. Four improved forms of the test with the directions are given on pages 281 to 285.

The significant words in the test questions were selected from the Ayres spelling scale, Terman's vocabulary test and the vocabulary test in the first edition of the Examiners' Guide.

Questions were arranged in blocks of seven. Each of the first four blocks contain words appropriate for a lower grade, and the last two blocks words for high school and college, respectively. It was believed that this arrangement might arouse interest, facilitate scoring, and possibly permit segregation by simple inspection of a critical block. The original form of the test was very similar to Form I. It was mimeographed in camp. Through the courtesy of Prof. E. A. Shaw, of Tufts College, it was given in November, 1917, to 817 pupils in the grades and high school at Somerville, Mass. Mr. L. B. Hoisington, of Cornell University, also conducted the test with 99 college students at that place. The junior high school group was composed of 39 eighth grade, 51 ninth grade, and 52 tenth grade pupils. The senior high school group was composed of 50 sophomores, 49 juniors, and 50 seniors. The college group was composed of 28 sophomores, 40 juniors, and 31 seniors in arts and science. The distribution of scores by grades is shown in table 28.

TABLE 28.—*Devens literacy, original mimeographed form—Somerville School and Cornell University.*

Schooling.	Distribution of literacy scores by grade.														
College										6	6	16	37	22	12
Senior high school						3	3	8	14	22	38	33	17	10	1
Junior high school						1	5	4	26	35	40	23	8		
VII				1	1	4	5	18	31	28	22	12	1		
VI				1		4	10	1	17	28	10	1			
V					2	3	8	24	27	6	5				
IV		2	1	1	5	13	19	24	13	5	1				
III		1		8	5	8	4	1							
II	6	8	6	7	7	2									
	0	1–3	4–6	7–9	10–12	13–15	16–18	19–21	22–24	25–27	28–30	31–33	34–36	37–39	40–42

The differentiation between grades on the basis of scores is reasonably good. Only 17 per cent of the so-called second-grade pupils scored zero, yet in reality, of course, they were first graders who had just begun work in the second grade. These facts were sufficient evidence of reliability to warrant further experimentation. Slight changes in the composition and order of a few questions were made and the test was printed. The printed form was given to 947 pupils in the schools of Medford, Mass. The distribution is shown in table 29. The median scores in the lower grades are now somewhat raised, due probably chiefly to greater legibility. The percentage of zero scores for the second grade is thereby also reduced from 17 per cent to about 4 per cent.

TABLE 29.—*Devens literacy, printed form—Medford School and Cornell University.*

Schooling.	Distribution of literacy scores by grade.													
College									4	6	13	27	29	20
Senior high school						1	1	5	10	27	48	44	45	19
Junior high school					4	8	28	50	85	81	58	21	10	1
VI				1	2	7	11	20	21	20				
V			1		8	8	21	22	17	7				
IV		1	2	4	5	15	18	20	13	5				
III	2	2	6	7	16	16	15	12	4	1	1			
II	12	11	12	14	10	1	2	3						
	0–2	3–5	6–8	9–11	12–14	15–17	18–20	21–23	24–26	27–29	30–32	33–35	36–38	39–42

In January, 1918, three additional forms of the test were devised. Determination of the relative difficulty of the four forms was made by trials of each (in compensating chronological order) with 835 pupils in the schools of Trenton, N. J. The tests were conducted under the direction of Principal J. M. McCallie. Distributions for these forms are given in tables 30 to 33 and norms may be computed therefrom.

TABLE 30.—*Devens literacy, mimeographed Form I—Trenton schools.*

School grade.	Distribution of literacy scores by grade.														
	0	1–3	4–6	7–9	10–12	13–15	16–18	19–21	22–24	25–27	28–30	31–33	34–36	37–39	40–42
XII									1	3	14	27	26	20	15
XI									5	7	14	28	22	13	5
VIII								3	10	24	22	16	8	1	
VII								12	28	25	21	5	2	1	
VI						1	6	16	21	30	14	5			
V							18	24	25	18	5	2			
IV				3	14	15	26	22	12	5					
III	4	4	6	12	10	22	14	12	1	2	1				
II	10	22	17	15	6	6	1								

TABLE 31.—*Devens literacy, mimeographed Form II—Trenton schools.*

School grade.	Distribution of literacy scores by grade.														
	0	1–3	4–6	7–9	10–12	13–15	16–18	19–21	22–24	25–27	28–30	31–33	34–36	37–39	40–42
XII								1	2	5	16	16	28	32	16
XI									1	10	25	20	21	11	6
VIII						1	5	10	19	27	13	5	2	1	
VII				1		2	8	27	31	19	3	2	1		
VI				1	3	10	24	23	20	7	3	2			
V			2	6	3	20	23	27	5	3	1				
IV			5	10	18	34	14	15	1						
III	2	8	8	13	18	25	12	1	1						
II	10	20	19	8	14	2	4	1							

TABLE 32.—*Devens literacy, mimeographed Form III—Trenton schools.*

School grade.	Distribution of literacy scores by grade.														
	0	1–3	4–6	7–9	10–12	13–15	16–18	19–21	22–24	25–27	28–30	31–33	34–36	37–39	40–42
XII							1	1	4	7	15	8	33	21	15
XI								2	8	8	15	23	19	7	12
VIII				2	1	8	12	21	14	13	5	6	2		
VII			2	2	10	18	20	20	15	3	1	4			
VI			1	2	15	27	24	10	7	6	1				
V			1	5	24	38	15	3	3		1				
IV			2	21	36	29	9								
III	3	5	12	16	23	17	5	7							
II	15	17	20	14	10	2	1								

TABLE 33.—*Devens literacy, mimeographed Form IV—Trenton schools.*

School grade.	Distribution of literacy scores by grade.														
	0	1–3	4–6	7–9	10–12	13–15	16–18	19–21	22–24	25–27	28–30	31–33	34–36	37–39	40–42
XII								1	1	2	14	17	37	25	13
XI									4	6	16	25	15	9	8
VIII						1	5	8	17	18	20	9	7		
VII					4	4	13	15	25	17	11	2	3		
VI			2	2	8	11	18	23	11	10	1	1			
V			1	2	10	26	29	19	1						
IV		2	4	10	21	35	19	2	1						
III	8	3	13	14	18	20	10	1	1						
II	12	16	21	17	9	2	1								

The correlations between grade and score are: For Form I, 0.872; for Form II, 0.889; for Form III, 0.857; for Form IV, 0.895.

In general, practice appears to have little influence upon scores attained in the test. The median score for all forms taken together and given first is 20.6; given second, 20.4; given third, 20.7; given fourth, 20.9. Even in the lower grades the first trials give practically as high median scores as the fourth trial, though one might suppose that the more complete understanding of instructions in the later trials might make for increased score, particularly in these grades. As the distribution tables show, Form I is easy, Forms II and IV are intermediate and about equal, and Form III is the hardest. The approximate medians, with all grades grouped, are: For Form I, 25; for Form II, 21; for Form III, 16.5; for Form IV, 20. Further evidence of reliability appears from the fact that the scores obtained by individuals in Form I correlate 0.891 with their score in Form II, and 0.931 with their average scores on all four forms.

The Devens literacy test, Form I, was given to about 570 white and 400 negro soldiers at Camp Dix in order to ascertain, first, whether adults reporting a given school grade as the highest they have attained give in general better or poorer scores than children actually in that grade; and, second, whether score in the Devens literacy test is a practical means of segregation. The distribution of scores for the reported grades are in table 34.

TABLE 34.—*Devens literacy, mimeographed Form I—Camp Dix.*

WHITE SOLDIERS.

Reported school grade.	Distribution of literacy scores by reported grade.														
College						1		2		1	6	6	16	11	10
High school						1	1	4	11	16	20	30	38	20	11
VIII						3	2	13	7	20	37	31	23	6	3
VII			1		2		4	5	15	11	15	11	6	1	
VI							4	3	13	7	9	9	6	1	1
V			1			2	2	5	5	8	5	3	2	1	1
IV	2					2	3	6	7	2	4	3		1	
III	1	1	1		1	1	2	2	3		3				
II			1												
I		3			1	1									
0	8	1	1												
	0	1–3	4–6	7–9	10–12	13–15	16–18	19–21	22–24	25–27	28–30	31–33	34–36	37–39	39–42

NEGRO SOLDIERS.

College											1	1	2	1	1
High school							1	1	3	9	1	4	4	1	
VIII						2	1	1	8	6	11	4			
VII		1			1		3	4	5	12	15	3	1	1	
VI		1		3			8	5	8	8	6	2	3	1	
V	1			1	2	2	8	11	11	14	5	5	1		
IV			2	2	4	7	15	14	17	12	1	2			
III		2	4	4	1	6	10	1	6	4	1		1		
II	1	3		7		5	4	3	3	2					
I	2	1			1			1	1						
0	11														
	0	1–3	4–6	7–9	10–12	13–15	16–18	19–21	22–24	25–27	28–30	31–33	34–36	37–39	40–42

As might be expected from the lesser homogeneity within the class-interval and the inaccuracy of reported grades, the correlation between reported grades and scores in the literacy test is less for soldiers than it is for school children; 0.652 for white soldiers and 0.654 for negro. The tendency for adult whites to give higher scores than children of the same degree of schooling is evident. The northern negroes, except in the lower grades, where they also excel children, give medians about the same as those of the white scholars. From the table of median scores (Table 35) these comparisons may be more readily made:

TABLE 35.—*Devens literacy—Median scores.*

Schooling	Cornell, original mimeograph form.	Somerville, original mimeograph form.	Medford, printed form.	Dix, negroes, Form I.	Dix, whites, Form I.	Schooling.	Trenton.			
							Form I.	Form II.	Form III.	Form IV.
College	35.8			35.4	35.9					
Senior high school		30.0	32.3	27.7	33.2	XII	34.8	36.1	35.4	34.9
Junior high school		27.9	26.8			XI	33.0	32.6	32.7	32.5
VIII				28.5	30.2	VIII	28.6	25.6	21.5	26.5
VII		25.2		27.2	27.2	VII	25.7	23.2	18.3	22.9
VI		24.6	24.2	24.0	27.7	VI	25.0	19.8	16.1	20.1
V		21.8	22.8	23.7	25.8	V	22.4	17.6	14.2	16.6
IV		19.0	20.3	20.6	22.8	IV	17.8	14.6	12.4	13.7
III		12.5	16.4	16.4	19.7	III	14.0	12.3	10.8	10.9
II		5.9	7.3	14.7	5.0	II	5.6	5.4	5.1	5.4

Tables 36 and 37 show the distribution of scores in examination *a* for the various literacy scores.

TABLE 36.—*Distribution of scores in examination a, for various scores in the literacy test, Form I—Camp Dix—white soldiers.* (*r.*=0.771.)

Literacy score.	Score in examination *a*.																				
40–42									1	1	1	1	4	7	4	4	3				1
37–39						1			1	4	1	7	3	4	7	9	2	1	1		
34–36					3		7	4	8	13	10	11	12	10	7	3	3				
31–33				1	1	1	8	8	12	15	20	10	8	7	2						
28–30		2	1	6	6	9	17	13	9	15	6	5	7	2	1						
26–27	1	1		3	9	16	9	8	15	6	3	2	3								
22–24	1	2	6	9	9	11	11	4	5	2	3			1							
19–21		5	9	4	5	9	4	1	2	3											
16–18	2	6	2	2	3		1	1													
13–15	3	1	1	1		1	1	1													
10–12	1		3																		
1– 9	6 2	2				1															
0	13 2		1																		
	0	10–29	30–49	50–69	70–89	90–109	110–129	130–149	150–169	170–189	190–209	210–229	230–249	250–269	270–289	290–309	310–329	330–349	350–369	370–389	

TABLE 37.—*Distribution of scores in examination a, for various scores in the literacy test, Form I—Camp Dix—negro soldiers.* (*r.*=0.781.)

Literacy score.	Score in examination *a*.														
40–42															1
37–39								1				1	2	1	
34–36				1					3	3	3	5	4		2
31–33					2	1	5	5	5	1	2		2		
28–30			1	1	3	6	7	10	8	5	1		1	1	
25–27			2	5	13	8	12	15	6	3		2	1		
22–24		1	7	13	14	12	10	4	1		1				
19–21	2	1	10	11	11	4	2	2							
16–18	1	4	17	15	5	5	3			1					
13–15	3	1	12	7	5										
10–12	1	4	4	2		2									
1– 9	7	13	7	2											
0	16	1	1												
	0	10–29	30–49	50–69	70–89	90–109	110–129	130–149	150–169	170–189	190–209	210–229	230–269	250–289	270–309

If a score of 22 in the literacy test is taken as the lower limit justifying retention of whites for examination *a*, those segregated as illiterate and yet receiving a grade of C in examination *a* form 4.2 per cent of the total group of 407, whereas those marked for retention on this basis and yet receiving below grade C form 8.1 per cent of the total. If the same score is taken as critical with the negroes, the corresponding percentages are 2 per cent and 22.1 per cent. If 25 is taken as critical with negroes these percentages become 6 per cent and 10.6 per cent.

We have no means of determining what degree literacy is required in order that a man may do himself justice in examination *a*. Whether or not men of literacy score 22 or more might not be better measured by an examination for illiterates than by examination *a*, we do not know. When this test of literacy was used, therefore, the rule adopted was that the literacy standard should be set as high as the practical conditions allowed. The scores suggest that northern negroes fail to secure as high grades in examination *a* as do whites of equal literacy. Table 38, which gives the median scores in examination *a* for each step in literacy, will make the point even clearer.

TABLE 39.—*Median scores in examination a of whites and negroes of equal literacy.*

Whites.			Negroes.	
Literacy.	Number of cases.	Examination *a*.	Examination *a*.	Number of cases.
40–42	27	265	280	1
37–39	41	268	234	5
34–36	91	232	192	21
31–33	93	191	143	23
28–30	99	173	137	44
25–27	76	147	118	69
22–24	64	120	85	63
19–21	42	101	64	43
16–18	17	60	54	51
13–15	9	60	46	28
10–12	4	56	37	13
1– 9	11	8	21	30
0	16	5	5	18

The interpretation of these results appears to be that negroes of the same degree of intelligence are relatively better in dealing with words than whites, whereas the whites excel in tests which involve other abstract operations.

Scores in the literacy test correlate rather higher with scores in examination alpha than with those of examination *a*. For 289 cases (white) at Camp Meade *r* with alpha equals 0.831. For 375 cases, white, at Camp Meigs *r* equals 0.813. For 380 cases (lower grade group of whites) at Camp Lee *r* was reported as 0.85. The Camp Meade and Camp Meigs distributions are presented in tables 39 and 40.

TABLE 39.—*Distribution of scores in examination alpha for various scores in Devens literacy test—Camp Meade—whites.*

Literacy score.	Literacy Form III.																						
	0	1–19	20–39	40–59	60–79	80–99	100–119	120–139	140–159	160–179	180–199	200–219	220–239	240–259	260–279	280–299	300–319	320–339	340–359
40–42															3	1		1	
37–39							1				1	1		1	1	2		2	2
34–36							2			1	1	6	3	4	2	2		1	
31–33							2			1	4	3	1	2	2	1	1		
28–30							1		3	1	2	4	1	1	3	1			
25–27									4	5	5	2	2						
22–24						1	2	4	5	9	3	1	1		1				
19–21					1	1	6	5	3	4	4	3	1			1			
16–18				1		4	2	6	2	3	2								
13–15				1	3	7	5	6	2	5									
10–12		1	1	2	3	1	5	2	2	1	4								
7– 9				1	3	2	3	3		2									
4– 6			2	2	1	3	1	3	2										
1– 3			4	3	3	3	1	3	3										
0	2		2	3	1			1		1									

TABLE 40.—*Distribution of scores in examination alpha for various scores in Devens literacy test—Camp Meigs—whites.*

Literacy score.	Literacy Form IV.																		
	0	1–19	20–39	40–59	60–79	80–99	100–119	120–139	140–159	160–179	180–199	200–219	220–239	240–259	260–279	280–299	300–319	320–339	340–359	360–379
41–42														1		1	1	1	2	
39–40										1		2	3	1	4	4	4	2	1	1
36–38										1		4	3	1	3	4	2	2		
35–36									2	2	6	3	5	5	6	2	2	1	1	
33–34									1	2	1	2	8	3	9	3	3			
31–32								4	1	2	3	9	5	3	4	1				
29–30							1	3	2	7	8	7	4	2	2		1			
27–28							1		7	7	5	7	2	3	1	3				
25–26							3	4	8	4		2	1	3						
23–24							2	4	7	7	3	1								
21–22			1				3	1	5	3	3	3	1							
19–20				1	2		5	5	3	3	2	1								
17–18		1					2	3	2		1	1								
15–16				2	1		4	1												
13–14			1	3	2		5	2	1											
10–12			1	3	3		2	2												
0– 9	1	1		2	1		1	2												

As a practical means of segregation, therefore, we conclude that the Devens literacy test is subject to the main criticisms which apply to the previous tests of literacy. In particular, it involves special blanks which must be distributed, collected, and scored. Even with inspection of the blanks, as a method of segregation, it requires two orderlies and takes 10 minutes to segregate a group of 100 subjects. Yet more time is required to score the tests and give an accurate grade in literacy, even when stencils are used. There is, furthermore, no guaranty that with any given critical score justice is done in allowing those above the critical score to take examination *a* or alpha and compelling those who fall below it to take the group examination for illiterates. The presumption is in favor of such a conclusion, but definite means of proof are wanting.

From its construction, from its relatively high correlations with school grade, from the fact that even with the lower grade of intelligence of second graders, few fail to grasp the instructions, the test gives evidence that it genuinely tests literacy (or reading ability) in the sense both of understanding printed sentences and visual vocabulary. If it should be made longer

and be modified so as to differentiate better in the upper grammar grades, it might be well adapted to survey work with school systems. Even in its present form it is probably a fair substitute for the vocabulary test of the individual scales, and it possesses the advantage of applicability to groups.

In the camps in 1918 the test was not used for the reasons above stated—special papers required, time required to distribute, inspect, collect, and score papers, match them with the group examination papers, and lack of necessity for reporting a grade in literacy as separate from intelligence. The examiners felt that the segregation problem reduced practically to one of detecting as quickly and accurately as possible men who would not secure scores better than D in examination alpha, without regard to whether such scores are due to lack of literacy or to lack of intelligence. Such men they desired to segregate and send to the beta examination at once, in order thus to avoid recalls.

The process of segregation which came to be used in 1918 is similar to that used at Camp Lee and Camp Taylor during the fall of 1917 and described in detail in chapter 13 of Part II. It is sufficient to notice here that original groups were divided by requiring that all men who could not read newspapers or write letters home should take the group examination for illiterates. Varying according to the character of the men examined, the strength of the examining staff, clerical force, and the like, certain other additional requirements might be enforced. Thus in many camps there was an additional requirement of fourth, fifth, or sixth grade schooling, and in the case of negroes sometimes as high as high-school literacy. In some camps, furthermore, men might be sent from alpha to beta before they had completed the former, if an inspection of the arithmetic test showed that fewer than eight of the problems in that test had been attempted in the five minutes allowed. The actual basis of segregation adopted in the various camps, together with the results of such segregation in terms of the percentage of men sent to the beta examination, is given in table 41. From the standpoint of a comparison of groups in different camps this lack of a uniform process of segregation is certainly unfortunate. On account of the variable facilities for examining and the variable quality of the groups examined however, it appeared entirely impossible to establish a standard uniform for all camps.

TABLE 41.—*Basis of segregation, 1918.*

Station.	Literacy basis.	Number examined.	Number sent to beta.	Per cent beta.	Per cent Negro.
Bowie	Read and write,[1] finished fourth grade	27,464	5,497	20.0	10.7
Cody	Fourth grade	43,482	5,003	18.8	.....
Custer	Read and write, Negroes, 5 years at school	54,354	10,004	18.4	9.9
Devens		50,031	11,370	22.7	1.7
Dix	Read and write	67,768	19,768	29.2	19.8
Dodge	Read easily, sixth grade	69,927	22,701	32.5	25.4
Funston	Read and write, finished fourth grade	75,673	21,987	29.0	35.5
Gordon	Read and write	63,648	16,119	25.3	10.8
Grant	Read and write rapidly, or seventh grade	83,229	24,218	29.1	18.8
Greene	Read and write, four years at school	27,807	10,512	37.8	38.6
Greenleaf	Read and write, fourth grade, and 5 years in United States	56,097	9,992	17.8	.8
Hancock	Read and write fairly, and reached sixth grade	44,433	12,714	28.6	5.1
Humphreys		13,981	1,957	14.0	.....
Jackson	Read and write	98,996	19,587	19.8	17.5
Kearny	Read, write, and speak English, and over fifth grade	18,921	2,931	15.5	.005
Lee		82,441	23,104	28.0	8.8
Lewis	Read and write	75,519	10,209	13.5	2.2
Logan	do	19,984	3,679	18.4	.3
Meade	Reached fifth grade	65,700	21,069	32.1	20.8
Pike	Read and write	75,942	21,891	28.8	16.1
Sevier	4 years at school (later 6 years at school)	24,139	6,567	27.3	18.7
Sheridan	Read and write (later 6 years at school)	55,165	11,985	21.7	10.0
Sherman	Sixth grade, Negroes, finished sixth grade	64,408	26,938	41.8	30.4
Taylor	Read and write, Negroes, finished sixth grade	53,336	10,672	20.0	16.9
Travis	Read and write	77,555	17,403	22.4	22.0
Upton	Read newspapers	61,559	14,486	23.5	15.4
Wadsworth	Northern recruits, third grade, southern recruits, fourth grade	67,704	13,442	19.9	6.0
Wheeler	Read and write, reached sixth grade (later seventh grade)	32,988	10,411	31.6	10.9
Total		1,552,256	386,196	24.9	14.2

[1] "Read and write" means "ability to read and understand newspapers and write letters home."

Several suggestions were made involving the brief scoring of parts of tests of the group examination for literates (especially the arithmetic, common-sense, and information tests) as a basis for determining whether or not the subject should be sent to the group examination for illiterates. In some camps it was quite impossible to make any recalls whatever of larger groups, whereas the possibility still existed of holding the alpha groups while this scoring was accomplished. The method evidently possesses possibilities as a means of segregation, as the combined score in the arithmetic and common-sense tests correlates 0.924 with total score in alpha. The method was not extensively used, however, since it is wasteful of blanks, and since in many cases it could be avoided by setting a sufficiently high standard for entrance to the alpha examination.

Section 2.—*Linguality tests.*

The non-English-speaking and illiterate recruits constituted such a serious clog to military efficiency that development battalions were organized to train these men in speaking English and in reading and writing. At first there was some tendency to appeal to the psychologist for a determination of the illiterate men to be sent to the development battalion. The psychologist, however, had no classification available except the segregation of men for the beta examination. To have sent all men segregated for beta to the schools of the development battalion would have been impracticable because of the large numbers involved. In fact, these schools in some cases were obliged to abandon the attempt to train English-speaking illiterates in reading and writing, and to concentrate on the more serious problem of the men illinguate in English as well as illiterate. The psychologist, cooperating with the non-English development battalion, was now in a position to develop a rough test whereby a man could be provisionally certified as English-speaking or non-English-speaking.

Linguality tests for this purpose were initiated at Camp Upton. A fairly accurate individual directions test was arranged, and a less accurate but usable group test, modeled after examination beta. The group test is too difficult at the start and is extended to an unnecessarily high level for purposes of calibration. The individual test is preferable, not only on the score of accuracy and level, but also because of its military nature. The following report from Camp Upton describes the nature and operation of the tests, which were never developed further because of the abandonment of development battalion schools with the signing of the armistice in November:

I. The Individual Linguality Test.

Verbal.	Performance.
E.	
1. What is your name? (Help.)	1. Sit down. (Help.)
2. How old are you? (Help.)	2. Put your hat on the table. (Help.)
3. How long have you been in camp? (Help.)	3. Stand up. (Help.)
4. Where is your home? (Help.)	
5. What did you do (work at) before you came into the army? (Help.)	
D.	
6. What is your name? (No help.)	4. Sit down. (No help.)
7. How long have you been in camp? (No help.)	5. Stand up. (No help.)
8. How old are you? (No help.)	6. Turn around. (Help.)
9. Where is your home? (No help.)	7. Put your hat on the table. (No help.)
10. What did you do (work at) before you came (got) into the army? (No help.)	8. Fold your arms. (Help.)
	9. Turn around. (No help.)
C.	
11. When the sergeant tells you to keep your eyes to the front, what does he mean? What does it mean to "keep your eyes to the front?"	10. Take two steps forward. (No help.)
12. What kind of shoes should a soldier wear? (No help.)	11. Turn your eyes to the right. (No help.)
13. What does it mean when you are told that you are "required to remain in your barracks?"	12. Put your hands on your shoulders. (No help.)
	13. Carry the right foot 6 inches straight to the rear. (No help.)
	14. Extend the fingers of the left hand. (No help.)

1. THE INDIVIDUAL LINGUALITY TEST—Continued.

B.

Verbal.	Performance.
14. What does this mean: "Do not enter the Captain's office without the sergeant's permission?"	15. Fold your arms. (No help.)
15. What does it mean when you are told to "keep always on the alert?"	16. Place your feet at an angle of 30 degrees. (No help.)
16. If an officer told you to remain in the "immediate vicinity," what would you do?	17. Rise on the toes and inhale deeply. (No help.)
17. Just what does it mean "to quit your post?"	18. Bring the elbows to the side and clench the fists. (No help.)
18. What is a "violation of orders?"	19. Raise the arms laterally until horizontal. (No help.)
19. What is meant by the "strength of an organization?"	20. Raise the arms vertically, palms to the front. (No help.)

A.

20. What does it mean for one man to "conform to the gait of another?"
21. Explain the meaning of this sentence: "The moment to charge is when you have broken the enemy's resistance and destroyed his morale."
22. Explain the meaning of this sentence: "Cavalry can not always prevent sudden incursions of the enemy."
23. Explain the meaning of this sentence: "The rate of advance is dependent upon the nature of the terrain."
24. What does it mean when two soldiers are said to be "mutually visible?"
25. Explain the meaning of this sentence: "A converging fire is more efficacious than a diverging."

TABLE 42a.

[Individual linguality test: Figures show per cent successes for separate items of test. Group I=460 men of non-English development battalion, including a few high grade English-speaking men of training cadre. Group II=173 English-speaking men from depot brigade and from company of heart defects.]

Verbal scale.			Performance scale.		
Item.	Group I (non-English).	Group II (English).	Item.	Group I (non-English).	Group II (English).
1	100	100	1	100	100
2	97	100	2	99	100
3	98	99	3	99	100
4	98	100	4	97	98
5	97	100	5	95	98
6	97	99	6	94	98
7	92	98	7	93	97
8	90	98	8	91	97
9	85	98	9	82	96
10	86	97	10	73	92
11	63	89	11	71	89
12	18	82	12	64	91
13	23	78	13	55	83
14	26	75	14	51	78
15	21	63	15	39	86
16	8	53	16	21	63
17	9	52	17	14	58
18	12	42	18	11	55
19	8	41	19	9	42
20	3	23	20	9	39
21	3	16			
22	3	12			
23	2	10			
24	2	9			
25	1	7			

Correlation of "verbal" and "performance" halves.—The correlation between scores on the two halves of the test is, in the case of the 460 non-English men from the development battalion, 0.788; and, in the case of the 173 English-speaking men, 0.796. For this reason it was assumed that there was no need to consider the two halves separately and that the score might be taken as the total successes, no matter on which half the successes were made.

Ratings.—Ratings have been assigned as follows:

E	D	C	B	A
0–8	9–19	20–27	28–39	40–45

The grounds for these assumptions were as follows:

(*a*) With certain exceptions the breaks from D to C, C to B, and B to A show abrupt changes in the curve of difficulty as measured by the percentages. They are the natural statistical breaks.

(*b*) Although the scale was intended to progress gradually, after working with the non-English subjects, it appeared that there were obvious abrupt changes in difficulty consistent with the statistical evidence.

(c) The E group was split off as a natural class in which language alone is inadequate for the communication of the simplest ideas, and other aids are required.

(d) The D group was taken as the level of language ability inferior to the comprehension of the simple explanations of drill. It was intended that the D and E groups should constitute the non-English class of men of language ability inadequate to the military situation.

(e) The C group was originally taken two points higher than at present. It was found that by lowering its limits two points the C to B line constituted almost exactly the limit taken by the instructors of the non-English development battalion as the point of "graduation" from that battalion. This decision was based upon a comparison of independent ratings by the instructors of the battalion and by the test in a considerable number of cases.

On this grouping the definitions of the ratings in military terms becomes easy. The following paragraph, explanatory of the significance of ratings, was included in a circular to company commanders:

Men can be tested for English-speaking ability and rated on a scale of A, B, C, D, E. In language the rating E means inability to obey the very simplest commands unless they are repeated and accompanied by gestures, or to answer the simplest questions about name, work, and home unless the questions are repeated and varied. Rating D means an ability to obey very simple commands (e. g., "Sit down," "Put your hat on the table"), or to reply to very simple questions without the aid of gesture or the need of repetition. Rating C is the level required for simple explanation of drill; rating B is the level of understanding of most of the phrases in the Infantry Drill Regulations; rating A is a very superior level. Men rating D or E in language ability should be classified as non-English.

II.—The Group Linguality Test.

The test form is shown herewith (figs. *a* and *b*. They were printed on opposite sides of a single sheet of book paper, 8 by 10½ inches).

PRELIMINARY DEMONSTRATION.

Preliminary demonstration with blackboard and orderly (analogous to beta) is used to teach the meaning of what it is to "put a cross on" something. The blackboard has a shovel, a pitcher, a boy, a flower, and a doorway with an open door. The demonstration is arranged to teach the subjects what a cross is, what it is to put it on a part, that it must be exactly on the part called for and not so large as to extend over the greater part of the picture. The shovel, the boy's foot, the handle of the pitcher, and the open door are finally crossed; the orderly makes two mistakes which are corrected.

GROUP EXAMINATION.

The examiner then picks up a paper and pointing to the men says, "Now, you take up your pencils; look here—number one on top here—see these pictures here—not the same as these (pointing to the blackboard); you do pictures here, Number 1, top."

"Now, listen. You (pointing to men), make cross (drawing an X in the air) on the hat."

"Now, look. On top again. These pictures. See the dog? Make a cross on the dog."

During these two tests the orderlies move quickly and quietly among the men, making sure that they get started and saying, "You know hat (or dog)—make a cross on the hat (dog)."

For these tests and the following ones the examiner must depend upon his judgment of the group as to how long each test should take, but in no instance should more than 10 seconds be allowed.

"Now, look here, Number 2. A boy—see—that's a boy." (Make sure by repetition that the men have found the right place.) "Make a cross on the boy's head."

"Now, look, Number 3. A house." (Repeat and point, if necessary.) "Make a cross on the roof of the house."

"Now, look, Number 4. A hand." (Holds up hand.) "Make a cross on the thumb."

"Now, Number 5—here. Make a cross on the envelope.

"Number 6—here. Make a cross on the girl's eyelash.

"Number 7. What is it? Make a cross on the muzzle of the gun.

"Number 8. Make a cross above the pig's back.

"Number 9. Make a cross at the entrance to this house.

"Number 10. Make a cross on the rear wheel of the automobile.

"Number 11. Make a cross on the spout of the kettle.

"Number 12. Make a cross beneath the horizontal line.

"Number 13. Make a cross at the base of the tower.

"Now turn your papers over so—Number 14—the letter—see.

"Number 14. Make a cross on the signature of the letter.

"Number 15. Make a cross on the pendulum of the clock.

"Number 16. The box. Make a cross on the partition.

"Number 17. Make a cross on the flange of the wheel.

"Number 18. Make a cross on the mosaic pattern.

"Number 19. See the two drawings? Make a cross at the point of conjunction.

"Number 20. Make a cross on the barb of the hook.

"Number 21. Make a cross on one of the tines.

"Number 22. Make a cross at the apex of the cone.

"Number 23. Make a cross on the filial descendant of the mare.

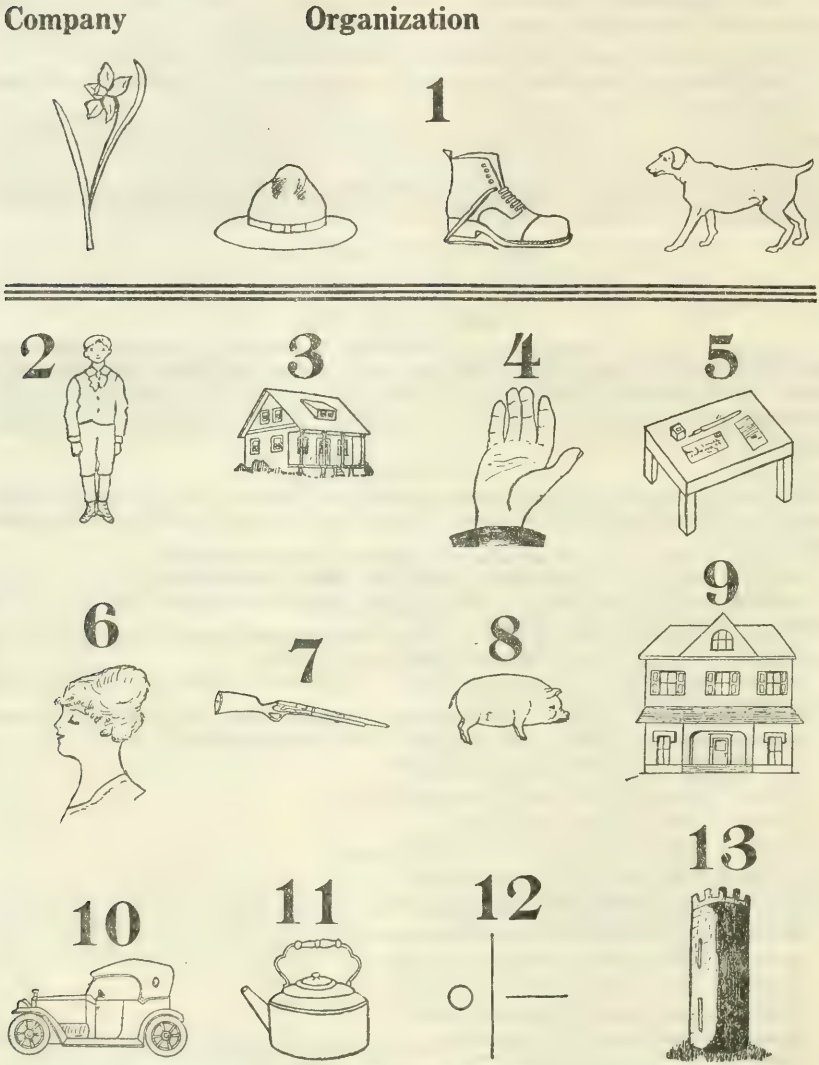

FIG. a.—First page of group linguality test.

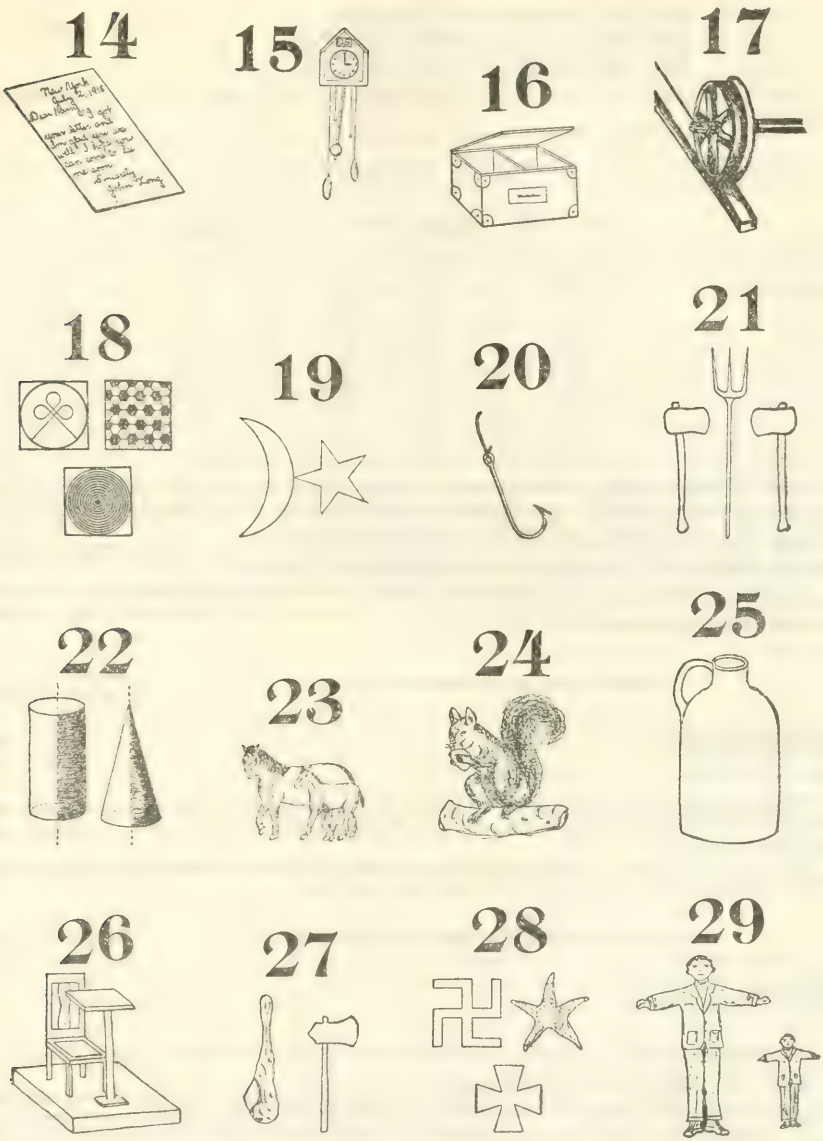

FIG. b.—Second page of group linguality test.

"Number 24. Make a cross on the caudal appendage of the squirrel.
"Number 25. Make a cross at the orifice of the jug.
"Number 26. Make a cross on the superior aspect of the pulpit.
"Number 27. Make a cross on the major protuberance of the bludgeon.
"Number 28. Make a cross on the sinister extension of the swastika.
"Number 29. Make a cross on the cephalic extremity of the homunculus."

The score is number of items right. Item 1 is a double item and is scored "right minus wrong," since sometimes everything is crossed.

Difficulty of items.—The per cents of successes for the items are shown in the second table (Table 42*b*).

TABLE 42b.—*Group linguality test.*

Item.	Group I (non-English).	Group II (English).	Item.	Group I (non-English).	Group II (English).
1A	81	95	21	24	62
1B	77	91	13	22	62
3	67	99	16	17	63
2	63	88	12	14	62
4	52	87	25	28	47
10	51	78	19	16	53
5	43	85	20	22	43
6	43	74	17	12	47
15	40	76	22	17	42
9	42	71	18	10	31
11	31	73	24	18	23
23	40	62	27	15	25
26	44	52	7	11	27
8	19	75	28	4	5
14	19	67	29	3	1

Figures of table 42b show per cent successes for separate items of test. Group I, 460 men of non-English development battalion, including a few high-grade English-speaking men from training cadre. Group II, 173 English-speaking men from depot brigade and from company of heart defects.

While there are some inversions in columns 2 and 3, the order of difficulty at the two levels of language ability is not greatly different, and the columns may be said to be approximately consistent.

Correlations of group with individual language test.—The coefficients of correlation between the group test and the individual test, taken in toto and separately in its "verbal" and "performance" halves, in the cases of the non-English and the English groups mentioned above, are as follows:

Correlations of group with individual linguality test scores.	Group I (non-English).	Group II (English).
Group with performance individual	0.682	0.723
Group with verbal individual	.756	.773
Group with total individual	.720	.796

Thus the group score appears to be related to either and to both halves of the individual test about as well as the two halves of the individual test are related to each other. Furthermore the relation is not altered by a change in the level of language ability.

Thus it seemed legitimate to combine the English and non-English groups and to compare (for the combined group) total individual score with group score. The following values were found:

Comparison of group and individual linguality test values (group of 860).	Individual test.	Group test.
Average	27.23	11.71
Standard deviation	8.55	7.55
Coefficient of correlation (630 cases)	.793	.....

The equation of correlation is therefore: Individual score =1.13 (Group score)+13.95. Inspection of the table of correlation shows that the correlation is linear.

Ratings.—The correlation of .79 was considered high enough to justify the selection of critical points on the group test as those corresponding to the critical points on the individual test determined by way of the equation of correlation.

The group test is much harder than the individual test. It is not possible to give a rating of E by the group test. This is not surprising when it is remembered that the points in the E group involve gestures and other aids, and not direct understanding of words

The correlation equation results in the following relations:

Rating.	Individual test.	Group test.
A	40 and up	23 and up.
B	28 to 39	12 to 22.
C	20 to 27	5 to 11.
D	9 to 13	Up to 4
E	Up to 8	

The maximum on the group test is 30; 28 points, however, correspond to the maximum of the individual test, 45. The average score in the group test for 111 American-born college students, graduate and undergraduate, men and women, at Columbia University is 26.45.

III. CAMP PRACTICE.

Form of test used.—The individual examination has the advantage over the group in that (*a*) it has a better range; (*b*) it is more accurate; (*c*) it is subject to the additional control that is true of all individual examinations; and (*d*) it furnishes the clinical examiner with illuminating information about his subject before he begins an intelligence examination.

When the numbers to be examined are few the individual test is always used. It averages about five minutes. When the numbers are large, the group test is given, the papers inspected, and all men falling within the non-English limits or nearly within these limits are given the individual examination. When the groups are large and the time is short, the group test alone is used, the papers inspected, and the men scoring low marked at once as "non-English."

Procedure within the development battalions group.—Men report to the Psychological Examining Board for intelligence and language ratings as soon as assigned to the development battalions group. All men scoring C, D, or E in the language test are rated "non-English" and reported as such to development battalions group headquarters. The reason for the inclusion of the C grade in the non-English group is that the requirement for "graduation" from the non-English battalion corresponds to the passage out of the C group into the B group. In other words, every man who can not pass the "graduating" examination of this battalion is assigned to this battalion until he can pass it.

Procedure with the draft, attached to depot brigade, before mustering.—All beta men are given a language test. The papers are inspected and all D and E men are marked "N E." The Camp Personnel Adjutant at Camp Upton does not believe that it is feasible at the present time to include the C grade of linguality in the non-English group in the case of the draft; too large a proportion of the draft would be sent to the non-English development battalion.

CHAPTER 6.

DEVELOPMENT OF A SUBSTITUTE GROUP TEST FOR ILLITERATES AND FOREIGNERS.

SECTION 1.—*Experiments in the camps.*

The imperative need for a group test for foreigners and illiterates which would measure general intelligence led to experimentation in all the camps looking toward the adaptation of various kinds of performance tests for group use. The most systematic and thoroughgoing efforts in this direction were made at Camp Devens and Camp Lee. Important work was also done at Camp Dix and two minor experiments were made at Camp Taylor. The Devens and Lee experiments utilized pencil and paper tests, while the experiments at Dix and Taylor made use of tests of more strictly the performance type. The Devens experiment was carried further than any of the others and served in the main as the basis for group examination beta.

Camp Dix.—In an important experiment at Camp Dix an entire regiment of engineers was given group examination *a*, the Stenquist test,[1] and the following supplementary tests adapted for group use: The Porteus maze,[2] Ruger's wire puzzles,[3] the Whipple digit symbol test,[4] memory for designs, and the cube construction test.[5] The regiment consisted of approximately 900 men, all of whom were given examination *a*, regardless of literacy. Practically all were given the Stenquist test and most were given the supplementary tests. Those who failed to take the supplementary tests constituted a nonselected group and therefore the results of the different tests are representative for this regiment. The supplementary tests were given as follows:

1. Porteus mazes for years, 10, 11, 12, and 13 were painted on a blackboard. Each man was given a maze blank and a pencil. Instructions: "Take your pencil, begin at S, and mark the shortest way out of this maze." One minute was allowed for each maze.

2. Ruger's puzzles: Each subject was given a box containing six wire puzzles, the simplest puzzle placed to the left, and was told to take as many apart as he could in five minutes.

3. Digit symbol: The Whipple sheets were used. The procedure was explained by demonstration. Time, five minutes. The Pyle symbol-digit [5] test was given in the same way and the score combined with that for the digit-symbol test.

4. Memory for designs: The Terman designs from the Examiner's Guide, enlarged 10 times, were shown one at a time on a chart. Verbal instructions; time, one minute for each part; scoring as in Examiner's Guide.

5. Cube construction: This was part (*c*) of test A of the individual examination series. Each subject was given a 3-inch painted cube and 27 1-inch cubes. Verbal directions as in Examiner's Guide. Time, three minutes.

The intercorrelations (Pearson method) are shown in Table 43.

TABLE 43.—*Intercorrelations of Dix tests.*

Test.	Group examination *a*.	Stenquist skill.	Porteus mazes.	Ruger puzzles.	Pyle digit-symbol.	Terman designs.	Cube construction.
Group examination *a*	.....	0.475	0.456	0.371	0.782	0.538	0.158
Stenquist skill	0.475	.....	.485	.427	.530	.495	.509
Porteus mazes	.456	.485	.....	.296	.529	.496	.396
Ruger puzzles	.371	.427	.296	.....	.237	.297	.264
Pyle digit symbol	.782	.530	.529	.237	.....	.600	.475
Terman designs	.538	.495	.496	.297	.600	.....	.439
Cube construction	.158	.509	.396	.264	.475	.439	.....
Average	.463	.487	.443	.315	.525	.478	.374

[1] The form of test used in the Army was one developed by Stenquist from the earlier form described in the following article: Stenquist, J. L., Thorndike, E. L., and Trabue, M. R. The Intellectual Status of Children Who are Public Charges. Arch. Psychol., vol. 5, no. 33, 1915, pp. 1–9.
[2] Porteus, S. D. Mental Tests for Feeble-Minded: A New Series. J. Psycho-Asthenics, vol. 19, no. 4, 1915, pp. 200–213.
[3] Ruger, H. A. The Psychology of Efficiency. Arch. Psychol., no. 15, 1910.
[4] Whipple, G. M. Manual of Mental and Physical Tests. Part 2, 1915, pp. 502–503. See also Pyle, W. H. The Examination of School Children, pp. 18–22.
[5] Loc. cit.

It will be seen that the digit-symbol test gives by far the best correlations. It not only correlates highly with examination *a* but, with the exception of the puzzle test, it correlates very well with all the others. However quite a number of illiterates and foreigners fail to do anything with it. The correlation figures, particularly those showing its high correlation with examination *a*, show that it is a promising group performance test.

The test correlating next highest is memory for designs and here again the lowest correlation is with puzzles. It correlates highest with the digit-symbol test and next with examination *a*. It also shows a fair correlation with the Stenquist and maze tests.

The maze test ranks next. But in this there appears a grouping of scores around the lower values.

The cube construction test correlates very little with examination *a*, but moderately well with Stenquist, digit symbol, and designs. It is believed that its relatively low correlations with other tests is due to lack of uniformity in methods of scoring and to the fact that bright subjects because of a slight error sometimes "wreck" their cubes near the end of the time allowance.

The Ruger puzzle test correlates very little with anything. Men of inferior intelligence, as measured by the other tests, received almost as high scores in the puzzle test as men of superior ability. The test is cumbersome, far from "coach-proof," and tends to create disorder in the group.

All the above tests were given by T. H. Haines to 30 inmates of the State Colony for Feeble-minded Males at Four Mile, N. J. The Binet mental ages of the subjects ranged from 4 to 11 years. From a study of the score distribution and the correlations with mental age Haines drew the following conclusions: (1) The use of the puzzle test is contra-indicated, as it gives a distribution of scores for feeble-minded subjects which closely resembles that for unselected soldiers. (2) The digit-symbol test should have further trial with illiterate foreigner. It is of value as a group performance test for English-speaking subjects. Smaller groups and improved procedure may render it satisfactory for use with foreign subjects. (3) The maze test, adapted for group use, should prove of value in the diagnosis of mental deficiency. (4) The test of memory for designs lends itself as well to group as to individual examining. "It is a piece of performance we can not dispense with in an attempt to sift out the mentally incompetent by the group method." (5) The cube construction test "commends itself as a most useful group test by which to gauge the intelligence of the individual."

As it turned out, only the maze test and the digit-symbol test (modified form) of the Dix series for illiterates found a place in the beta scale finally adopted. Undoubtedly, however, an excellent and workable beta scale could have been based upon the supplementary tests used in the Dix investigation. The maze test, the digit-symbol test, and the test of memory for designs supply a fairly satisfactory measure of the intelligence of illiterate and foreign subjects.

Camp Taylor.—J. Crosby Chapman devised what he called the "cube distribution test" for the group examination of English-speaking illiterates. Materials for each subject: Four small boxes (painted red, blue, yellow, or green) and 10 cubes. Size of group to be examined, 50 to 100.

The following directions are given, each beginning with "attention" and ending with "go":

Part 1. (*a*) Put *one* cube in each of the boxes except the blue box. (*b*) Take the cube in the *red* box and put it in the *blue* box. (*c*) From the pile in front of you put *one* cube in the *red* box and *two* cubes in the *yellow* box. (*d*) From the pile in front of you put *one* cube in the *blue* box and the rest in the *green* box.

Part 2. (*a*) Put *one* cube in *each* of the boxes *except* the *blue* and *yellow* box. (*b*) From the pile in front of you put *one* cube in the *blue* box, *two* cubes in the *yellow* box, and *one* in the *green* box. (*c*) From the pile in front of you put *one* cube in the *blue* box, *two* cubes in the *green* box, and *one* cube in the *yellow* box.

The test was given to 102 men in the Jeffersonville (Ind.) Reformatory who had been tested by the Stanford-Binet. The per cents passing for the different intelligence quotient groups were as follows:

Intellligence quotient groups	50–59	60–69	70–79	80–89	90–99	100–109
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Passed both parts	00	32	50	83	70	100
Passed one or both	44	89	96	100	100	100
Failed in both	56	11	4	00	00	00

At the same camp E. A. Doll arranged three construction tests for group use.

(*a*) Cube test: A 2-inch cube, painted all over, and eight 1-inch cubes, painted on three sides that form a corner. The small cubes are to be built up to resemble the model.

(*b*) A picture construction test. A picture postcard cut in eight pieces is to be reassembled.

(*c*) A picture postcard cut in 12 pieces is to be reassembled. Each test is scored for time to complete task.

The test was given to 185 inmates of the Jeffersonville Reformatory whose Stanford-Binet mental ages were known. The correlations with mental age were as follows: Cube test, 0.44; 8-piece picture, 0.43; 12-piece picture, 0.49. The mental ages ranged from 8 to 16. The following intercorrelations were found: Cube and 8-piece picture, 0.53; cube and 12-piece picture, 0.55; the two pictures, 0.68.

Camp Lee.—The psychological examiners at Camp Lee devised a complete group performance scale consisting of 15 tests. It was entirely a pencil and paper test. The test items were all arranged, the drawings made, and the procedure fully defined; but owing to the fact that the beta test devised at Camp Devens somewhat preceded it, it was never put to trial as a scale. Certain of the tests and ideas, however, were incorporated in the beta scale as finally adopted. The plan of the Lee scale is as follows:

(1) The scale should be one that would serve as a measure as nearly as possible comparable with group examination *a*, but so arranged that the instructions would require the use of no language whatever except the words "go ahead," "stop," and "attention." (2) Responses should involve only marking with a cross, writing the correct number in the correct place, and simple drawing. (3) The 15 tests were to be tried out, the most promising ones modified as results might indicate to be desirable, and the least satisfactory ones eliminated.

Space does not permit the reproduction of the drawings and blanks, but a fair idea may be gained of the tests from the following verbal descriptions:

Test 1. Manikin test: The picture of a human trunk with the head, arms, and legs detached. The latter are pictured at one side of the page, each with a number under it. The subject places the appropriate number at the appropriate place on the trunk to indicate where each member belongs. Similarly for the picture of a cat with head, leg, and tail detached.

Test 2. Mutilated pictures. (The beta test, later adopted and known as the picture completion test.) This included among others the following pictures: The four Binet mutilated pictures; a man with a leg missing; a table with a leg missing; a pitcher with a handle missing; a gun without a trigger; a child carrying an umbrella that has no handle; a baseball batter in striking position with no bat in his hand; a clock face with one hand missing; a baby carriage without handles; an automobile without steering gear; a locomotive without a smokestack; a telephone without a receiver, etc.

Test 3. Detection of similarities: On the left side of the page, arranged in a column, are 10 geometrical figures of different shapes, numbered 1, 2, 3, 4, 5, and so on consecutively from top to bottom. On the right side of the page, also arranged in a column, are the same figures, but in a mixed-up order. The subject is required to find the figure on the right side of the page which is like figure 1 at the left and draw a figure "1" in it; he then does the same for 2, 3, 4, 5, and so on.

Test 4. Detection of differences: On the left side of the page, arranged in a column, are various pictures and drawings of different degrees of complexity. On the right side of the page, opposite a given picture on the left, are two pictures side by side. One of these is an exact duplicate of the picture or form on the left; the other resembles it, but is somewhat different. The subject is required to mark that one of the two pictures on the right which is exactly like the one on the left. Among the pictures and forms on the left are a postage stamp,

a triangle with a dot in one corner, an octagon, the number 13674, a cube, a man's face, two books, a quarter dollar, a penny, an alarm clock.

Test 5. Situation test: Seventeen sets of pictures, each set being made up as follows: The first picture of the set represents a situation or object. To the right of it are five small pictures, one of which, and one only, is obviously related to the first picture. The subject is required to mark that one of the five small pictures which is associated with (which "belongs with") the first picture at the left. The following are sample series: "Situation picture"—a holdup man pointing a pistol at a victim, who is holding up his hands. To the right are the following pictures: A base ball, a catcher in action, a young woman, a boy with a toy gun, a policeman with a club, and a Chinaman. Obviously, it is the policeman who is associated with the "situation picture." In another set, at the left, is the picture of a lock; to the right, pictures of an ink bottle, an envelope, a watch, a key, and a basket. In another set the "situation picture" is an envelope without a stamp. To its right are pictures of a fork, a barrel, a postage stamp, an alarm clock, and a pick. In another set, the "situation picture" shows a woman standing in front of a cook stove, while to the right are the pictures of a slate, a stew pan, a wheel, a sled, and a shoe.

Test 6. Picture completion test: A modification of the Healy picture completion test.[1] Numbered squares take the place of the inset in the original Healy test, and mixed up among 36 small pictures at the right are the pictures which would complete the numbered missing parts of the main picture. The subject is required to find the correct picture for a given blank square and to write on it the number corresponding to that in the square.

Test 7. Substitution test: Taken without modification from the Woodworth-Wells series.[2]

Test 8. The symbol-digit test: Taken from the Pyle[3] series without modification.

Test 9. Counting backward: On the page are 20 small rectangles arranged in a row. The subject begins at the right, and proceeding from right to left, writes in the successive rectangles the numbers 20, 19, 18, 17, etc.

Test 10. Memory span; digits forward: Given as in group examination *a*, beginning with two digits and ending with eight.

Test 11. Memory span; digits backward: Like test 10, except that the subject is expected to begin at the right-hand square and write the last digit first; then, in the next square to it, the next to the last digit, etc. It apparently was not observed by those who devised this test that the subject might write the numbers in direct order without detection. The same objection holds for test 9.

Test 12. Drawing designs from copy: Designs used: Square, diamond, square inside of square, and five-pointed star.

Test 13. Position test: The subject is given a sheet of paper on which are printed 17 squares, each approximately 1½ inches on the side and subdivided into 36 smaller squares. The subject is shown a chart containing a large square similarly subdivided, with the figure 1 in some of the subdivisions. The subject's task is to place a figure 1 on his paper wherever it occurred on the chart. Seventeen charts are shown.

Test 14. Imitation test: A paper modification (by T. L. Kelley) of the Knox cube test.[4] A chart is shown containing two rows of dots, four dots in each, to be used as samples. Two trials are given in which the examiner draws chalk lines connecting various dots, leaving the demonstration in sight while the men draw similar lines connecting the dots on their papers. For the remaining trials the demonstration consists in merely indicating lines of connection by means of a pointer.

Test 15. Cube analysis: A test of counting rows and piles of cubes in a picture. The test contains 13 parts. In modified form it became test 2 in the beta scale finally adopted.

There can be no doubt that a useful group performance scale for illiterates and foreigners could have been constructed from the Camp Lee suggestions. It is unfortunate that more of

[1] Healy, W. A. A Pictorial Completion Test. Psychol. Rev., vol. 21, 1914, pp. 189–203.
[2] Woodworth, R. S., and Wells, F. L. Association Tests. Psychol. Monog., vol. 13, no. 57, 1911, pp. 53–55.
[3] Op. cit., pp. 18–22.
[4] Knox, H. A. A Scale Based on the Work at Ellis Island for Estimating Mental Defect. J. Amer. Med. Assoc., vol. 62, 1914, p. 742.

the tests did not receive a trial. The following, however, were included in the beta trial series though in modified form: Detection of similarities, mutilated pictures (picture completion), the imitation test, cube analysis, digit symbol, and the position test (modified into the spot-pattern test).

Camp Devens.—The problem of devising a group test for illiterates and foreigners was even more systematically studied at this camp than at any of the others. Three investigations were reported.

Investigation 1: Three performance tests were devised and given, in addition to the Stenquist test, to 48 feeble-minded subjects in the State School for the Feeble-Minded, at Waverley, Mass., and to 69 soldiers of less than fourth-grade literacy. The three tests were memory span for digits (visual exposure); arithmetical reasoning (problems similar to those in the individual series, test T, original examiner's guide); memory for designs (including the diamond, figures *a* and *b* of test P, original examiner's guide, and the two Binet designs).

The rank difference correlation between mental age and the three supplemental tests was 0.65 for the feeble-minded subjects. With the same subjects the best correlation that could be secured for mental age and the Stenquist test, however scored, was 0.32. It was evident that these three brief tests, requiring 15 or 20 minutes, were very much more useful than the Stenquist test in identifying the feeble-minded.

Investigation 2: The same three supplementary tests and two additional ones were given to 117 literate men of three companies. The subjects were mostly of superior ability, only 7 of the 117 testing below 100 in examination *a*. The two additional tests included were the dynamometer test and a motor coordination test. In the latter a sheet containing a large number of rather small squares was placed before the subject. The task required was to draw a small circle in each square without touching any side of the square. Immediately after the men had been given the above five tests they were given examination *a*. The correlations with examination *a* were as follows: Dynamometer, 0.30; circles, 0.24; memory span, 0.43; arithmetical reasoning, 0.62; designs, 0.55; composite of memory span, arithmetical reasoning, and memory for designs, 0.68. The dynamometer and circle tests, as might have been expected, proved to be unsatisfactory measures of intelligence. The other three tests again make a reasonably satisfactory showing.

Investigation 3: A more important experiment than either of the former was arranged by C. R. Brown. It will be noted that the tests just described, while perhaps suited to illiterate English-speaking subjects, were not suitable for foreigners. Brown prepared a series of five group performance tests of the pencil and paper variety which could be given without the use of language and which required no writing in the response. The tests follow:

Test 1. Maze test: Essentially the form of the maze test included in the final beta scale. Time, 2½ minutes.

Test 2. Picture sequence: Essentially as is shown on pages 242 and 243. Six out of the 12 sets of pictures were contained in Brown's original series. Response by drawing arrows to indicate the proper sequence of pictures. Time, 3½ minutes.

Test 3. Series completion: This is in principle the same as the X–O series test included in the final beta scale. The problems, however, of which there were 11, were not quite identical with those finally adopted. It will be observed that the test is an attempt to translate test 8 of examination *a* into terms that would make it serviceable for illiterates. Response, by making crosses. Time, 2 minutes.

Test 4. Line length: An adaptation of the Huey-Yerkes letter line test for group use. Instead of letters, however, it utilized 10 pairs of geometric figures. The task was merely to decide which figure of a pair required the greater length of line. Response, by checking. Time, 1 minute.

Test 5. Pictorial analogy: This test resulted from an attempt to translate test 9 of examination *a* into terms suitable for illiterates. Of the 18 sets of figures included in Brown's original series, 17 sets were included practically unchanged in the beta trial series (Part I, pp. 244 and 245). Response, by checking.

The tests of Investigation 3 and also examination *a* were given to 70 unselected literate men. The correlation of composite scores of the five tests with examination *a* was 0.88. The correlation of the separate tests with examination *a* was as follows: Maze, 0.456; picture sequence, 0.766; series completion, 0.724; line length, 0.483; pictorial analogies, 0.772.

This group of tests was more original in conception and more satisfactory in its results than any other series devised for the purpose. Although only two of the five tests were included in the final beta scale, the ideas which they embodied proved very helpful when the beta trial series was constructed in January, 1918.

SECTION 2.—*The beta trial series.*

Experiments in the four camps had shown that the Stenquist test was unsatisfactory for the purpose for which it was intended; also that other types of performance tests, requiring no material except pencil and paper, which could be given expeditiously and scored by stencil, were feasible. Accordingly, in the latter part of December, 1917, arrangement was made by the staff of the Division of Psychology to construct a group examination for foreigners and illiterates. Capt. Wm. S. Foster, who had been in charge at Camp Devens, directed the work. W. S. Hunter (who worked for a short time only), K. T. Waugh, A. S. Otis, C. R. Brown, R. H. Wheeler, and W. P. Tomlinson assisted.

The purposes and requirements of this examination (beta) were formulated as follows by the group:

The (beta) examination is intended primarily for the group testing of foreigners and of others too nearly illiterate in English to do themselves justice in examination alpha.

All oral and written instructions, except a few simple phrases required in maintaining order and securing attention, should be avoided. Instructions should be given, and with the assistance of a trained orderly, in the form of four demonstrations at the beginning of each test. Gestures and pantomine should be used where such procedures are serviceable and can be standardized.

Relation of beta examination to alpha examination: (*a*) Beta examination is designed for men making a score below a certain point in the literacy test. It is, therefore, a substitute for alpha primarily for lower grade men. (*b*) Scores in beta should be comparable with scores in alpha and the former should be standardized in terms of the latter. (*c*) Letter grades A, B, C, D and E should be given on the basis of beta score just as for alpha. (*d*) The beta tests should be patterned after the alpha tests as far as possible.

The beta examination should test a variety of intellectual processes. The separate tests should range in difficulty from every easy to difficult.

The scale should meet the following requirements: (*a*) It should be suitable for administration to groups of 25 to 100 men. (*b*) The examination time should be not more than one hour. (*c*) No material should be required except pencil and paper. (*d*) All responses should be made by drawing line, checking, or crossing out, with the possible exception of writing numbers. (*e*) Each test should be scored by stencils. (*f*) Duplicate "forms" should be possible.

In order to reduce individual examining as much as practicable, there should be some very easy tests with high diagnostic value. The instructions should be such as low grade men can readily comprehend.

With the above criteria in view, the following tests were selected for trial:

1. Maze.
2. Form recognition.
3. Number recognition.
4. Dot imitation.
5. Pictorial completion.
6. Cube analysis.
7. Line comparison.
8. Picture sequence.
9. Digit symbol.
10. Spot pattern.
11. Picture analogies.
12. Geometrical construction (Form board representation).
13. Series completion.
14. Picture situation.
15. Memory for designs.

An idea of the nature of each test may be gained from the procedure as described hereinafter, and from the test blanks which are reproduced in Part I, (pp. 235 to 258).

The following brief statements indicate the origin of each test:

Test 1. Maze.—Proposed by C. R. Brown and tried out by him with success at Devens. Present form devised by Brown, January, 1918.

Test 2. Form recognition.—Proposed by Otis, and the items devised by him in January, 1918. This form of the test was original with Otis, though a different method of testing form recognition had previously been used by Thorndike.

Test 3. Number checking.—The test was proposed and the items arranged by E. S. Jones, after Scott's test of accuracy, which, in turn, was borrowed from Thorndike.

Test 4. Dot imitation.—This pencil and paper adaptation of the Knox cube test was suggested by Kelley. In the form of a line of four dots it was tried at Lee and later at Dix. The connecting lines made by examiners tended to blurring and confusion and prevented accurate scoring. Otis suggested that all movements to the right be made above the line, and all movements to the left below it, but the confusion persisted. Foster suggested the present arrangement of two rows of three dots each. Wheeler arranged the specific items of the test.

Test 5. Pictorial completion.—Test proposed and items devised by Kelley. Patterned originally after the Binet mutilated pictures. Pintner was among the first to use this general form of the test. Most of the items of this test, as used in the beta trial series, were unsatisfactory.

Test 6. Cube analysis.—Originally suggested and items devised by Edwards at Camp Lee. Improved and the present items arranged by Otis, January, 1918. It was thought that this test would take the place of the usual form of test for arithmetical reasoning.

Test 7. Line Comparison.—Proprosed by Brown and tried out by him at Devens. Items arranged by Wheeler. Copied after the Huey-Yerkes letter-line test.

Test 8. Picture sequence.—Proposed by Brown and tried out by him at Devens. Present items arranged by Brown. The test is an adaptation of the sequential picture test used by Decroly,[1] Miss Bowler, Whipple, and others.

Test 9. Digit symbol used at Dix.—Present symbols devised and items arranged by Otis in January, 1918. Modeled after the well-known substitution test, used in various forms by Woodworth and Wells,[2] Whipple,[3] Mrs. Woolley,[4] Pyle,[5] Pintner,[6] and others.

Test 10. Spot pattern.—Proposed by Foster. Patterns devised by Foster, Wheeler, Brown, and Otis. Brown and Foster are responsible for introducing variation into the figures.[7] Considerably adapted from the spot pattern test described by Whipple.[8]

Test 11. Picture analogies.—Originated by Brown in an attempt to translate test 9 of group examination *a* into terms suitable for illiterates. Items devised by Brown and tried out by him with success at Devens.

Test 12. Geometrical construction.—Otherwise designated as "form board representation." Suggested first by Toll. Present general form suggested by Foster. Present items arranged by Wheeler, January, 1918. Patterned after the various form board tests, and after the Yerkes patience test for adults.[9]

Test 13. X-O series (series completion).—Originated by Brown in an attempt to translate test 8 of group examination *a* into terms suitable for illiterates. The test was tried by him with success at Devens. An improvement in the original form of the test was suggested by Foster. Present items were arranged by Brown.

Test 14. Picture situation.—Proposed in somewhat different form by Edwards at Camp Lee. Present modification suggested by Foster, and items devised by him. Patterned after the Healy picture situation test.

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[1] Decroly, O. Epreuve Nouvelle pour l'examen mental et son application aux enfants anormaux. Année Psychol., vol. 20, 1914, pp. 140-159.

[2] Op. cit., pp. 53-55.

[3] Op. cit., pp. 502-503.

[4] Woolley, H. T. and Fischer, C. R. Mental and Physical Measurements of Working Children. Psychol. Monog., vol. 18, No. 77, pp. 148-184.

[5] Loc. cit.

[6] Pintner, R. and Paterson, D. G. A Scale of Performance Tests. 1917, pp. 63-67.

[7] It is a matter of interest that only a few minutes after this test had been suggested in the group at work in the Surgeon General's Office the manuscript of a report was received from the psychological staff at camp Lee recommending the inclusion in the beta scale of practically the same test (see test 13 of the Lee series).

[8] Op. cit., pp. 204-206.

[9] Boston Medical and Surgical Journal, April, 1917. Vol. 176; pages 564-573.

Test 15. Memory for designs.—Used at Devens and Dix. The designs used were chiefly those of Binet and Terman.

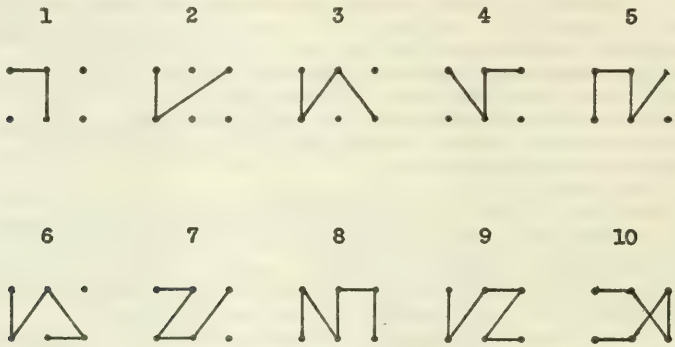
SECTION 3.—*Procedure for beta trial series.*

[For the form of the blank for the beta trial series, see Part I, pp. 235 ff; for the blank of the revised beta, pp. 250 ff; and for the proceedure in the revised beta, referred to below, pp. 162 ff.]

The general directions preceding the directions for test 1 were essentially the same as those for the revised beta. A rotating chart was used as an aid in demonstration. This contained a few sample items for each test. The procedure followed was for the examiner to show the orderly, by pantomime, what to do; then, as the subjects looked on, the orderly demonstrated the test by doing all the sample items.

Test 1. Maze.—Procedure essentially as for revised beta, except that the allotment of time was 2½ minutes instead of 2.

Test 2. Form recognition.—Turn chart to sample items and say, "PENCILS UP; LOOK." Orderly watches while examiner points with pointer to standard form. Examiner shakes head and says "NO" to each of the forms until he comes to the identical one, then touches the standard again and says "YES," and draws an imaginary line through the identical form. Same for second line of sample. Examiner then lets orderly step to the blackboard. Orderly draws line



Ten diagrams used in Dot Imitation, Test 4.

slowly and scrutinizingly through the appropriate form in each of the four samples. When the demonstration is over, the examiner holds up beta blank, points to both pages and says "ALL RIGHT; PENCILS DOWN; GO AHEAD. BOTH PAGES." Orderlies see that men do not stop at end of first page. At the end of 1½ minutes say "STOP; TURN OVER THE PAGE TO TEST 3."

Test 3. Number checking.—Procedure essentially as in revised beta.

Test 4. Dot imitation.—White chart made ready. Say: "THIS IS TEST 4—THE DOTS ON THE NEXT PAGE; LOOK." Orderly watches while examiner traces with pointer on the chart the diagrams shown herewith, one at a time—one second per line of diagram. Most of the time the pointer rests on the dots but makes sweeps relatively slowly. Orderly imitates by drawing chalk lines on blackboard in appropriate places:

After samples have been demonstrated, erase them. Then say: "LOOK, NUMBER 1; PENCILS UP," and give diagram 1. Then say: "PENCILS DOWN; GO AHEAD." At end of 5 seconds say: "PENCILS UP; LOOK," and give diagram 2. Repeat as before. With items 1 to 4 give 5 seconds for reproduction, and with items 5 to 10 give 10 seconds. After each reproduction, say: "PENCILS UP; LOOK." After giving each diagram, say: "GO." At end of test say: "STOP; TURN OVER PAGE TO TEST 5."

Test 5. Pictorial completion.—Essentially as for revised beta, except that the time was 5 minutes instead of 3.

Test 6. Cube analysis.—Procedure essentially as for revised beta, except that the time was 4 minutes instead of 2½.

Test 7. Line comparison.—"THIS IS TEST 7 ON THE OPPOSITE PAGE." Roll chart into position. "PENCILS UP; LOOK." (As the verbal description of procedure is long and rather pointless unless accompanied by the demonstration samples, it is not given here in detail. It involves the use of covered wires of lengths corresponding to lines of samples. These covered wires were laid over the lines corresponding to them, and then straightened out to show which line was longest.)

Then say: "ALL RIGHT; PENCILS DOWN; GO AHEAD." Examiner holds up the booklet and points to appropriate page.

After four minutes say: "STOP; TURN OVER THE PAGE TO TEST 8."

Test 8. Picture sequence.—"PENCILS UP; LOOK." (Sample items are here shown similar to those of the test. Examiner shows, by pointing, the correct order of pictures in these samples. According to the original instructions orderly then draws arrows to show the appropriate shifts to place them in correct sequence. Since this method proved difficult to score, after a few trials the modification was introduced of having the orderly number the pictures to indicate sequence.)

Examiner says: "ALL RIGHT; PENCILS DOWN; GO AHEAD. BOTH PAGES."

After 4 minutes say: "STOP; TURN OVER THE PAGE TO TEST 9."

Test 9. Digit-symbol.—Procedure essentially as for revised beta, except that the time was 3 minutes instead of 2.

Test 10. Spot pattern.—Procedure essentially as for revised beta.

Test 11. Pictorial analogies.—Roll blackboard to proper position. "PENCILS UP; LOOK." (The verbal description of procedure will not be reproduced here. The demonstration and pantomime were intended to call attention, first, to a connection or relationship between the first two pictures or terms of an item, and next to a relationship between the third term and one of the alternative fourth terms.)

Examiner points to both pages and says: "ALL RIGHT; PENCILS DOWN; GO AHEAD—BOTH PAGES."

After 2½ minutes say: "STOP; TURN OVER THE PAGE TO TEST 12."

Test 12. Geometric construction.—Procedure essentially as for revised beta.

Test 13. X–O series (series completion).—Procedure essentially as for revised beta, except that the time was 2 minutes instead of 1 minute, 45 seconds.

Test 14. Pictorial situation.—Roll samples into position. "PENCILS UP." Pointing to the empty square and to pictures to fill it. Point to first possible filler picture in first sample, shake head and say "NO"; same for second and third possibilities; at fourth say "YES" and nod head; point to fifth and sixth and say "NO." Motion to orderly, who then makes a cross through proper filler picture. Similarly for sample 2. Orderly chooses slowly and with evident effort the third and fourth samples.

Examiner points to both pages and says: "ALL RIGHT; PENCILS DOWN; GO AHEAD—BOTH PAGES."

After 3 minutes say: "STOP; TURN OVER THE PAGE TO TEST 15."

Test 15. Memory for designs.—"PENCILS UP; LOOK." Examiner points to sample charts one at a time for 10 seconds each. Orderly watches, then reproduces. Say: "LOOK; PENCILS UP." Expose first design 10 seconds, then say: "PENCILS DOWN; GO." One minute for reproduction. "PENCILS UP; LOOK." Expose second design for 10 seconds. "DOWN; GO AHEAD." One minute. Same for the two remaining designs.

Designs used were those of the original Binet scale, the Terman designs from the individual examinations series, and two other sample drawings of the same general type.

Section 4.—*Revision of beta trial series.*

The preliminary form of beta (15 tests) was revised in February and March, 1918, and reduced to eight tests. The work was in charge of Maj. Yoakum, who was assisted by Lieuts. Brigham and Otis, and Miss Cobb.

The revision was based upon data from three sources:

1. At Camp Meade (February, 1918) the Three hundred and fourth Ammunition Train was examined as an experimental group. This gave literacy, alpha, and beta records for an unselected group of 298 men. As it later appeared the group was one of average ability.

2. At Camp Lee (first week in March, 1918), 479 men of a literacy-alpha group (all who had made below 100 weighted score, on examination alpha) were given 10 or 12 tests of the beta trial series.

3. At the training school, Vineland, N. J. (February, 1918), 77 feeble-minded males whose mental ages ranged from 6 to 11 years were given the beta trial series.

In addition 35 men were tested at Camp Meigs, but as the data from this source played little part in the revision they are not set forth here.

Practically all these examinations were given by Yoakum and Brigham or under their direction.

The procedure followed in giving and scoring the tests at Meade was essentially that described in section 3, above. The following experimental variations were introduced at Lee: For test 6 (cube analysis) the time was reduced from 4 to 3 minutes; for test 8 (picture sequence), from 4 to 3 minutes; for test 9 (digit symbol), from 3 to 2 minutes; test 10 (spot pattern) was shortened to 10 items; in test 15 (designs) the models were exposed in pairs. Tests 4 (dot imitation), 7 (letter line), and 11 (analogies), were omitted for all Camp Lee groups, and tests 2 (form recognition) and 13 (X–O series) for most of them. With one Vineland group test 11 (analogies) was given by using the third picture of each analogy as a stimulus for free association with a response picture, without regard to the first two terms of the analogy.

The method of demonstration by pantomime proved to be feasible. Most of the tasks were clearly indicated. As arranged in the preliminary form, however, test 11 (analogies) was responded to as though it were a free association test, with the third term as stimulus. Even so the test showed 30.7 per cent of zero scores in the unselected group. Test 2 (form recognition) gave 19.3 per cent zero scores in the unselected group. Test 7 (letter line), though extremely easy for one who got the idea, nevertheless gave 14.9 per cent zero scores in the unselected group. Test 8 (picture arrangement) was difficult to demonstrate, giving 11.1 per cent zero scores in the unselected group. It was decided, partly also on other grounds, to drop these four tests. Of those retained, test 12 (geometrical construction) was the most difficult to demonstrate. The introduction in the revised form of a simpler sample effected some improvement.

During the study several different total scores were made up. Five tests were discarded before the first totals were added and were never included in any beta totals. These were tests 2 (form recognition), 4 (dot imitation), 7 (line comparison), 8 (picture sequence), and 11 (analogies). The total score first used was the sum of the raw scores in the other 10 tests, that of test 9 (digit-symbol) being divided by 5 and that of test 12 (geometrical construction) multiplied by 2. This gave a maximum score of 185. (It should be borne in mind, in looking at the correlations of beta tests with beta total, that the five tests omitted played no part in determining that total. The distributions of total scores for the three groups of subjects were characteristically different.)

The Pearson correlations of each test with alpha total and with beta total are given in table 44:

TABLE 44.

Test.	Meade subjects (298 unselected).		Lee D and E men, 479.	Test.	Meade subjects (298 unselected).		Lee D and E men, 479.
	r with alpha total.	r with beta total.	r with beta total.		r with alpha total.	r with beta total.	r with beta total.
1. Maze	0.50	0.82	.....	9. Digit, symbol	0.54	0.85	0.81
2. Form recognition	.29	.57	.....	10. Spot pattern	.61	.76	.61
3. Number checking	.54	.80	0.77	11. Picture analogies	.....	.....	.....
4. Dot imitation	.59	.....	.....	12. Geometrical construction	.58	.78	.69
5. Pictorial completion	.58	.75	.73	13. X–O series	.45	.77	.67
6. Cube analysis	.51	.67	.75	14. Picture situation	.60	.76	.82
7. Line comparison	.....	.....	.....	15. Designs	.64	.84	.77
8. Picture sequence	74	74	.88				

The Pearson correlations of beta total with alpha total are: Total of 10 beta tests, unweighted, r with alpha 0.795; total of eight beta tests weighted, r with alpha 0.793; total of eight beta tests, unweighted, 0.790. The eight tests indicated were those included in the revised scale.

For the Camp Lee groups, in which all the alpha scores were below 100 (weighted score), the correlation of alpha total with beta total was 0.65.

The scatter with mental age for the Vineland group of 77 feeble-minded subjects is shown in table 45. It will be seen from the table that the beta examination is difficult enough to prevent feeble-minded subjects from making high scores. On the grade basis later adopted only one of the 77 subjects of mental age 6 to 11 years made a grade of C, and only a small proportion of the total number succeeded in making D. Certain of the tests proved especially effective in keeping down the scores of the feeble-minded, notably test 12 (geometrical construction), on which none of these subjects scored above 2. It was partly on this ground that test 12 received a heavy weighting.

TABLE 45.—*Total score, weighted, eight tests.*

Mental age.	0–9	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100–109	110–119
11			1		1		1					
10		5	1	1		1	1					1
9	6	2	2	4								
8	8	8	2	2	2	2		1				
7	7	3		2								
6	12	2	1									

The distribution of scores on each of the 15 tests for each group (unselected, low, and feeble-minded) was considered. Although each of the tests brought out differences between the groups, some did so much more sharply than others. This was an important factor in the final selection of tests.

Summarizing, the investigation brought out the following facts:

1. That group intelligence tests for foreign and illiterate subjects are feasible, and that the procedure employed in the trial series is fairly satisfactory.

2. That the 15 tests included in the preliminary form of beta are not of equal validity or practicability, but that all except three or four are usable with only slight changes.

3. That the total score of eight of the tests correlates 0.79 with alpha total and makes a fairly sharp distinction between groups known to differ in intelligence.

SECTION 5.—*Choice of tests.*

This was determined chiefly by the following considerations: (1) Correlation with alpha and beta total scores; (2) clearness with which average, low, and institutional subjects were differentiated; (3) ease of demonstration, as shown by low percentage of zero scores; (4) economy of time in giving and scoring, and economy of space in record blank.

The purely practical considerations were important. Tests 2, 7, 8, and 11 gave entirely too many zero scores for inclusion in their present form. Test 15 was eliminated chiefly because it requires about 50 per cent more time to give than most of the others and because it is difficult to score. For the sake of convenience no two-page test was included; test 5 being reduced to one page and retained, while tests 2, 8, 11, and 14, all two-page tests, were eliminated.

The following are the important facts regarding the several tests, including reasons for retention or rejection:

Test 1. Maze.—Retained without change because it makes an excellent "first" test. It can be successfully demonstrated; gives few zero scores. It correlates fairly well with total scores of alpha and beta, but does not make a very sharp distinction between good and poor groups.

Test 2. Form recognition.—While it is possible that this test might have been improved by easier demonstration samples and easier items at the beginning of the test, it had serious disadvantages. The demonstration was unsuccessful (19.3 per cent of zero scores at Camp Meade and 31 per cent at Camp Lee). It showed the lowest correlations with intelligence of all the tests tried, and is rather too easy, once the idea is caught. It was therefore dropped.

Test 3. Number checking.—Test 3 was retained, being satisfactory on all counts except that it does not make a very sharp separation between good and poor groups. The only change is the substitution, in the demonstration, of simpler numbers for some of those originally used.

Test 4. Dot imitation.—Of tests 4, 10, and 15, which seemed to be testing similar processes, test 4 was dropped as the one of the three showing the greatest number of zero and perfect scores, the poorest correlation with alpha total, and the poorest separation between good and poor groups. The differences were small, however, and test 4 had the advantage that the feeble-minded made very low scores in it. It might well be used in an alternative form of beta examination.

Test 5. Pictorial completion.—Test 5 was retained on all counts, except that it took two pages in the book and over 6 minutes to give. By better arrangement of pictures, by rejecting the largest and putting in drawings with simple lines which could afford reduction, 20 items have been put on one page. The test was studied item by item for relation to alpha and beta total scores, and the 11 best items from the original form remain in the present form. Of the six samples in the new demonstration, four are new. The time was later reduced from 5 minutes to 3 minutes.

Test 6. Cube analysis.—Test 6, while not among the most successful of the beta tests, was not particularly poor, and had the advantage of brevity. It seemed likely, too, that by replacing some of its items by less obvious ones it might very easily be improved. Test 6 was thus tentatively included in the new beta, pending improvement, with a reduction of the time limit to 3 minutes.

Test 7. Line comparison.—Test 7 was an immediate case for rejection. The very high per cent of zero scores, in conjunction with the high per cent of perfect scores, showed that it was much too easy once the idea was conveyed, but that far too often the demonstration failed. The distribution is the reverse of normal—i. e., U-shaped. It seemed not worth while to try to remedy these difficulties, which apparently are inherent in the test.

Test 8. Picture sequence.—Test 8 was tried both with response by numbers and arrows. The former was better, but even so the demonstration did not succeed very well. Since it seemed closely related to tests 5 and 14, and poorer than either, test 8 was dropped.

Test 9. Digit-symbol.—Test 9 was retained on all counts. The time limit was reduced because it seemed after trial at Camp Lee that the amount covered in the first 2 minutes was probably a better index than that in 3 minutes.

Test 10. Spot pattern.—Test 10 was indicated for retention on all counts except that it required much time and was closely related to test 15. Test 15, although it gave excellent results, took even longer to give than 10. Accordingly 10 was retained, but with a reduction of the number of items from 20 to 12. The correlation between the left-hand and the right-hand halves of the page (10 items each) was 0.73, and since the items were correlated with alpha and beta totals and the best 12 selected instead of the left-hand 10, the reliability of this test in its revised form is probably fairly high. This reduction brings the time under 6 minutes.

Test 11. Analogies.—Test 11 was dropped as impossible to demonstrate in its present form. It was not studied in other respects.

Test 12. Geometrical construction.—Test 12, good in all respects except for its high per cent of zero scores, was particularly good in differentiating the feeble-minded. It was therefore included and heavily weighted in the new beta total. The time limit was increased to 3 minutes, with the idea that this might serve to distribute the scores more widely. A simpler sample in the demonstration was substituted for one of the more difficult samples.

Test 13. X–O series.—Test 13 is rather easy and gives a high per cent of perfect scores, but since it seemed to be effective in indicating the institutional feeble-minded group and in separating good and poor groups, and was a brief, one-page test, it was included in the beta.

Test 14. Picture situation.—Test 14 proved an excellent test and was omitted from the new beta on practical considerations only. It seemed related to test 5 and test 8, and could less easily be reduced to one page than could test 5. It was hoped, however, to revise test 14 in this direction and to have it ready for an alternate form of examination beta.

Test 15. Memory for designs.—Much the same may be said of test 15 as of test 14. It was excellent, but took more time than test 10 (also a visual memory test), which was preferred to test 15 on this basis. It would make an excellent alternative for test 8 (picture sequence).

The revised beta was therefore composed of the following tests: (1) Maze, (2) cube analysis, (3) X–O series, (4) digit symbol, (5) number checking, (6) pictorial completion, (7) geometrical construction, and (8) spot pattern.

Section 6.—*Scoring the tests.*

It was found that if the tests in beta were not weighted, two tests (number checking and cube analysis) would contribute almost half of the variability of the total. Of these, cube analysis was not considered one of the best tests. Moreover, geometrical construction, which it was desired to weight heavily, would be making the least contribution. It was therefore decided that the tests in beta should be weighted. Weighting was done on the basis of the interquartile range in each test (table 46).

Table 46.—*Interquartile range and weights given in each test of revised beta.*

Test.	Old No.	New No.	Interquartile range.		Weight given.	Weighted range.	
			Lee.	Meade.		Lee.	Meade.
Maze	1	1	5.2	3.5	2	10.4	7.0
Number checking	3	5	11.5	13.7	1	11.5	13.7
Pictorial completion	5	6	5.1	6.2	2	10.2	12.4
Cube counting	6	2	8.6	5.8	1	8.6	5.8
Digit symbol	9	4	9.0	17.0	[1] 1	9.0	17.0
Spot pattern	10	8	3.6	6.0	2	7.2	12.0
Geometric construction	12	7	3.6	5.4	4	14.4	21.6
X-O series	13	3	6.0	6.2	2	12.0	12.4

[1] The raw score of the digit-symbol test is one-third of the number of correct items.

The weighting adopted gave a total score of 219.

As a matter of fact, the correlation of weighted and unweighted beta (as revised) was 0.987 for the Meade unselected group, and their separate correlations with alpha were practically identical (0.793 and 0.790). The wisdom of the decision to weight the scores is therefore open to question.

The grades assigned to scores in beta were adjusted according to the distribution of the scores (weighted totals) in the three groups of data. By drawing the line between C and D at 80, all the cases in the institutional group (except one) would be graded D or E, and thus it was expected all such cases would be recalled for individual examination. The line between D and E was set at 40, placing all the 6 and 7 year cases in the E group. This ruling gave just 5 per cent of the Meade unselected group a grade of E, and 15.3 per cent D, which seemed satisfactory. For the upper part of the distribution only the Meade group was available. Since this was mistakenly thought at the time to be a group rather below the average, A was made to include only 2.1 per cent (200–219) and B, 16.8 per cent (170–199). Letter grades were tentatively defined in terms of score as follows: A = 200–219; B = 170–199; C+ = 140–169; C = 100–139; C− = 80–99; D = 40–79; E = 0–39.

Table 47 gives the score distributions (expressed as per cents) found for the three groups: (1) 298 unselected men, Meade; (2) 479 Lee men who fell below 100 in alpha; (3) 77 feeble-minded at Vineland.

Table 47.—*Score distributions for the separate tests of the preliminary form of beta.*

TEST 1. MAZE.

Group.	0	1	2	3	4	5	6	7	8	9	10
1	4.4	1.4	2.7	6.1	8.1	7.1	11.8	11.5	19.0	15.2	12.5
2											
3	52.0	9.1	10.4	10.4	9.1	2.6	2.6	2.6	1.3	0	0

Test 1 was given, but older scoring rule was used.

TABLE 47.—*Score distributions for the separate tests of the preliminary form of beta*—Continued.

TEST 2. FORM RECOGNITION.

Group.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	19.3	5.1	6.1	5.4	4.1	5.8	5.8	4.8	6.1	3.7	2.4	3.7	2.4	5.1	5.1	7.5	7.5
2	42.5	7.6	6.1	6.1	0	3.0	9.1	6.1	4.5	1.5	0	4.5	3.0	4.5	1.5	0	0
3	85.7	5.2	2.6	2.6	1.3	1.3	0	1.3	0	0	0	0	0	0	0	0	0

TEST 3. NUMBER CHECKING.

Group.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25
1	6.9	7.2	3.7	3.4	6.2	6.5	3.4	12.7	6.5	15.4	9.2	4.8	14.1
2	36.6	8.3	5.6	8.0	7.1	12.1	8.2	7.3	3.2	1.6	0.6	0.8	0.2
3	72.8	11.7	6.5	5.2	2.6	0	0	0	0	1.3	0	0	0

TEST 4. DOT IMITATION.

Group.	0	1	2	3	4	5	6	7	8	9	10
1	5.8	7.8	14.9	9.2	12.5	12.9	12.5	9.2	8.5	4.4	2.4
2											
3	71.4	10.4	6.5	6.5	1.3	2.6	1.3	0	0	0	0

TEST 5. PICTURE COMPLETION.

Group.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	3.4	3.0	2.0	0.7	5.1	4.7	8.1	8.1	10.8	9.1	7.4	9.1	5.4	6.4	5.4	4.0	4.7	2.0	0.3	0.3
2	31.3	12.5	8.3	8.5	10.2	7.1	5.8	6.0	4.0	3.3	2.5	1.2	0.6	0.4	0	0.2	0	0	0	0
3	50.7	14.3	11.7	3.9	7.8	2.6	3.9	3.9	0	0	1.3	0	0	0	0	0	0	0	0	0

TEST 6. CUBE COUNTING.

Group.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	3.7	1.4	1.0	2.0	2.7	2.7	2.7	3.0	2.7	6.1	6.4	9.8	9.8	9.8	14.2	11.8	9.8
2	16.8	8.1	5.6	8.9	5.0	5.6	4.6	4.8	3.5	8.9	7.1	5.8	7.5	2.9	4.6	0.6	0.4
3	27.3	22.1	16.9	7.8	3.9	7.8	1.3	1.3	2.6	3.9	5.2	0	0	0	0	0	0

TEST 7. LETTER LINE.

Group.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	14.9	5.4	4.4	3.7	5.4	2.0	2.4	2.0	0.7	2.0	0.7	1.0	1.4	1.4	1.7	4.1	3.4	5.8	8.5	15.9	13.2
2																					
3	62.4	16.9	10.4	6.5	1.3	1.3	0	0	0	0	0	1.3	0	0	0	0	0	0	0	0	0

TEST 8. PICTURE ARRANGEMENT.

Group.	0	1	2	3	4	5	6	7	8	9	10	11	12
1	11.1	6.3	5.3	4.8	1.5	1.9	3.4	4.8	5.8	3.9	7.7	16.4	27.0
2	52.2	4.4	3.3	3.1	1.5	2.1	2.5	2.9	3.7	4.6	5.8	7.9	5.8
3	83.1	3.9	2.6	3.9	0	0	1.3	1.3	0	0	1.3	1.3	1.3

TEST 9. DIGIT SYMBOL.

Group.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	4.8	2.0	3.0	2.7	3.0	1.4	3.0	4.4	5.1	5.4	4.4	2.4	5.1	5.8	6.4	8.5	3.4	3.7	25.4
2	26.2	13.3	9.0	6.5	8.1	8.5	5.8	6.5	5.2	2.9	1.9	1.9	1.9	0.8	0	0.8	0	0.4	0
3	46.7	16.9	11.7	5.2	3.9	3.9	2.6	2.6	3.9	0	1.3	0	1.3	0	0	0	0	0	0

TABLE 47.—*Score distributions for the separate tests of the preliminary form of beta*—Continued.

TEST 10. SPOT PATTERN.

Group.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1.7	2.0	1.7	2.4	2.7	3.4	6.4	6.4	6.8	8.1	11.2	8.1	8.8	6.4	4.7	6.1	4.4	3.4	4.7	0.3	0
2[1]																					
3	46.7	10.4	9.1	5.2	5.2	9.1	3.9	2.	1.3	2.6	1.3	0	2.6	0	0	0	0	0	0	0	0

TEST 11. ANALOGIES.

Group.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	30.7	10.6	10.6	6.5	4.4	3.4	2.0	2.4	3.1	2.7	2.4	4.8	2.4	5.1	3.1	4.4	1.4	0.7	0
2																			
3	89.6	6.5	2.6	0	0	1.3	0	0	0	0	0	0	0	0	0	0	0	0	0

TEST 12. GEOMETRICAL CONSTRUCTION.

Group.	0	1	2	3	4	5	6	7	8	9	10
1	9.5	8.8	7.5	9.5	10.5	12.2	9.8	7.5	7.5	8.8	8.5
2	51.2	9.6	8.6	4.8	6.7	4.6	4.8	5.4	2.1	1.2	0.6
3	83.1	11.7	5.2	0	0	0	0	0	0	0	0

TEST 13. X-0 SERIES.

Group.	0	1	2	3	4	5	6	7	8	9	10	11	12
1	2.4	4.4	3.7	6.1	4.4	7.4	4.1	5.4	6.5	10.2	11.8	12.2	23.4
2	22.2	6.1	12.1	3.0	6.1	10.4	7.6	7.6	7.6	7.6	1.5	4.5	1.5
3	63.6	29.8	6.5	1.3	0	5.2	1.3	0	1.3	0	0	0	0

TEST 14. PICTURE SITUATION.

Group.	0	1	2	3	4	5	6	7	8	9	10	11	12
1	8.1	3.7	4.1	5.4	8.1	8.1	6.4	9.8	9.5	11.2	9.5	11.2	4.8
2	36.6	7.7	7.9	5.6	9.1	6.0	8.5	5.2	5.4	4.2	2.5	0.4	0.4
3	63.6	3.9	1.3	13.0	1.3	6.5	6.5	1.3	2.6	0	0	0	0

TEST 15. DESIGNS.

Group.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21
1	4.4	6.8	6.7	5.7	6.4	10.9	19.6	12.2	14.9	9.6	2.7
2	46.5	21.5	14.6	8.6	4.6	3.4	1.6	1.2	0	0	0
3	55.9	20.8	10.4	6.5	3.9	1.3	1.3	0	0	0	0

[1] Half only of test 10 was given to this group.

Summary of the (revised) beta examination.

Tests.	Time.	Weight.	Changes in August, 1918.
	Minutes.		
1. Maze	2½	2	Weighting eliminated, raw score reduced by half. Time reduced to 2.
2. Cube analysis	3	1	Time reduced to 2½.
3. X-0 series	2	2	Time reduced to 1¾. Weighting eliminated.
4. Digit symbol	2	1	No change.
5. Number checking	3	1	Dp.
6. Pictorial completion	5	2	Time reduced to 3. Weighting eliminated.
7. Geometrical construction	3	3	Time reduced to 2½. Weighting eliminated.
8. Spot pattern		2	Dropped.

A critical estimate of the beta examination and an account of the changes which it underwent as a result of a special investigation are set forth in chapter 7.

CHAPTER 7.

DATA OBTAINED THROUGH MORE EXTENSIVE CAMP TRIAL OF EXAMINATION BETA, AND RESULTING MODIFICATIONS.

SECTION 1.—*Plan of procedure and reports from camps.*

The beta examination was available for camp use in April, 1918. The instructions were that it be given (*a*) to all men eliminated from alpha because of relative illiteracy; (*b*) to all men taking alpha and falling below weighted score of 100 (below C−). Of those taking beta all those falling below weighted score of 40 (below D) were to be recalled for individual examination. It was understood that an individual examination should always be given before assigning an E grade to a man. It is important to remember this general setting for beta in the whole scheme of the camp examining as a basis for the interpretation of results. As a matter of fact few camps were able to follow the above instructions absolutely. In many the pressure of examining illiterates, especially foreign illiterates, was so great that no recalls from alpha were possible; in others only men falling below 50 in alpha (E cases) were recalled, while in others conformity with the plan as laid down was possible. These variations in procedure were responsible for numerous differences in results.

Reports of results, with suggestions and criticisms regarding both procedure of giving the tests and the basis of assigning grades for beta, began to appear shortly from the various camps. These reports were practically unanimous in their expressions of opinion regarding the serviceability of the method and the fact that it filled a big gap in the scheme of examining. They suggested also numerous detailed points of procedure, many of which were incorporated in the final edition of the Examiners' Guide. This guide (see Part I, pp. 153 ff) presents the final instructions issued regarding procedure. It should be noted, however, that there remained far greater tendency toward deviation in procedure from camp to camp with reference to beta than with reference to alpha. Adaptations which were reported as meeting the particular camp conditions more effectively than did the prescribed method were as a rule permitted.

The main burden of the early reports was to the effect that the most difficult task was "getting the idea across." A high percentage of zero scores in any given test was considered an indication of failure to "get that test across." In general it was insisted that the method of presentation, including especially the work of the orderly, was of prime importance. Such statements as the following make this clear: "There is no doubt that beta is many times harder to give than alpha and requires constant effort from everyone concerned. Nothing can be more fatal to it than the alpha method of giving."

Distributions of scores reported offered considerable difficulties of interpretation. Certain camps maintained, on the basis of these distributions, that men were being graded too severely on beta, whereas others held that the reverse was true. Since beta was given only to men who either had been eliminated from alpha because of illiteracy or had made a low score in alpha, there were no standards as to what to expect of these groups. This was particularly true of distributions which showed great preponderance of low-grade cases. Obviously a group selected for beta by the procedure as described could not be expected to measure up to the general standard of the rest of the camp. Whether any given group was overseverely rated was, therefore, largely a matter of personal opinion, based either on general impressions of the group, or on the ratings in individual examination of those recalled from beta. The former judgment would obviously be largely influenced by the personal equation and would therefore be unconvincing; the latter, while based on facts, would point only in one direction.

Cases recalled unnecessarily would be observed, whereas cases missed who should have been recalled would not be noted. The tendency would be therefore to urge lowering of the standard for recall perhaps quite unwarrantedly.

When, on the other hand, a selected beta group was found to show a rating approximating the level of the remainder of the camp, with the majority of cases raising their ratings above those obtained by alpha, there was legitimate ground for suspicion that beta was proving overlenient, unless it be admitted that alpha was hopelessly unsatisfactory at the lower portion of the scale. An obvious point of practical importance arose when it was remembered that only men standing lowest in alpha had the opportunity to raise their scores in beta. Accordingly men making C− or more and in many camps men making D had no opportunity to improve their ratings, while those rating as low as E might raise their grades even to an A or B.

Further light was thrown on the discrepant results reported from different camps by noting the difference between "beta-only" groups and "beta-from-alpha" groups. The former contain in largest numbers the foreign and entirely illiterate; the latter consist largely of English-speaking men of at least some schooling, who considered themselves able to take alpha but who had failed in alpha. On theoretical grounds it might be assumed that the former would profit most by the opportunity furnished by beta, since they might include all types of cases from bright to dull from among those who were handicapped either by language difficulty or by absolute lack of educational opportunity. The beta-from-alpha groups, representing mainly those of some literacy and little or no language difficulty, who, nevertheless, had failed in alpha, would seem likely to have been fairly low-grade groups. However, these groups made a consistently better showing in beta than was made by beta-only groups.

The illustrations below are typical. While the groups from the two camps differ from one another in general level the beta-only group is in both instances lower than the recalled group.

Percentages making given grades in beta.

	E.	D.	C−.	C.	C+.	B.	A.
CAMP CODY.							
Beta from alpha	3.0	22.1	18.4	41.5	11.4	3.5	0.2
Beta only	30.2	41.3	11.8	11.7	3.9	0.4	0.2
CAMP DIX.							
Beta from alpha	1.7	11.4	9.2	24.5	19.3	19.4	14.7
Beta only	22.9	30.2	11.4	16.5	8.5	4.8	5.5

It was observed further that all camps which reported distributions as showing extreme instances of severity on the part of beta were reporting mainly beta-only groups. In most cases, owing to special conditions, they had been so overwhelmed with the examining of cases eliminated from alpha that they had not been able to handle any recalls and thus did not have these in mind. Impression regarding overleniency of beta came on the other hand from camps where a considerable amount of recall was possible.

SECTION 2.—*Special study of group from Camp Custer.*

To throw further light on the above problem, data on beta examinations as given in the regular course of camp routine were studied. Since the results of this study were suggestive and pointed the need for further information, results on one camp (Custer) will be summarized briefly.

As an aid to interpretation a distinction was made between white men born in English-speaking countries and those born in non-English-speaking countries. It is probable that while the former may be counted on as practically free from language difficulty, the latter, while containing the men of the group who are handicapped in this way, would also contain some men who had no appreciable difficulty of this sort. We shall, however, in the absence of more complete information, use the two groups as representative of those handicapped by

language difficulty and those not so handicapped and for the sake of brevity shall designate them as "English speaking" and "non-English speaking."

The figures of Table 48 indicate the numerical relations of the beta groups to the total group of which they are a part:

TABLE 48.—*Camp Custer group.*

Group differentiation.	English speaking.		Non-English speaking.		Total.	
	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.
Total number reported	1,904	100.0	386	100.0	2,290	100.0
Number below 100 in alpha (D and E cases)[1]	585	30.7	194	50.3	779	34.0
Number below 50 in alpha (E cases)[1]	231	12.1	133	34.4	364	15.9
Number given beta only	19	1.0	134	34.7	153	6.7
Number either below 50 in alpha or given beta only	250	13.1	267	69.2	517	22.6
Number rated E by beta	10	0.5	63	16.3	73	3.2

[1] Letter ratings based on standards in force at time of examining.

Correlation tables were plotted for alpha score with beta total score and with score on each separate test. The values of the coefficients were not computed, as it was realized that these would necessarily be low, since we were dealing with only a segment of the whole distribution, and since, moreover, it was uncertain whether differences in alpha scores within this range had much significance. From inspection, however, it seemed evident that if the group falling low in alpha represented, with even approximate fairness, the lower portion of the total group a surprising number of cases were making high scores in the various tests and on the total beta score. This was brought out quite strikingly when the data on the 250 English-speaking cases who had either made E in alpha or been given beta only were summarized. Reference to Table 48 shows that these cases made up only 13.1 per cent of the total English-speaking group. Since they were not handicapped by language difficulty it would appear safe to assume that they were not far from being the lowest 13 per cent of the group. Assuming even partial correctness for this statement the following proportions of cases in the various grades as assigned for beta at this time seemed difficult to justify.

Percentages making given grades on beta—250 English-speaking men, either E in alpha or eliminated from alpha—Camp Custer.

Beta grade	E	D	C−	C	C+	B	A
Percentages	1.6	26.4	19.6	41.2	10.4	0.8	0.0

Table 49 shows the percentage distributions of the English-speaking cases for the separate tests. Without discussing this in detail it may be noted that the majority of the tests showed a considerable proportion of scores in the upper part of the range of the given test. While this would not be a valid objection, provided the tests were to be used only for this lower range, it becomes serious when beta is used for the whole range. The only tests for which an appreciable number of high scores did not appear were tests 4 and 5 (digit symbol and number checking).

TABLE 49.—*Percentage distributions of men who either made scores below 50 in alpha or were eliminated from alpha—Camp Custer—250 English-speaking cases.*

Score.[1]	Separate Tests of Examination Beta.							
	1	2	3	4	5	6	7	8
30								
29								
28								
27								
26								
25								
24								
23				0.4				
22					0.4			
21				0.8	0.4			
20				0.4	1.2	0.4		
19				0.4	0.8	0.4		
18				1.2	0.8	3.2		
17				2.8	6.4	4.8		
16		1.6		3.6	4.4	8.0		
15		2.8		4.4	5.2	7.6		
14		2.8		7.2	7.6	8.4		
13		7.2		4.8	4.8	14.8		
12		8.0	1.2	6.8	5.6	12.4		1.2
11		6.4	2.4	9.6	9.6	10.8		2.0
10	1.6	9.2	8.8	7.2	7.6	7.6	2.4	7.6
9	10.0	9.6	7.6	5.2	9.2	6.8	5.6	9.6
8	16.4	5.6	6.8	7.6	3.2	4.0	6.4	16.4
7	14.8	5.2	10.8	10.0	5.6	4.0	6.0	17.6
6	12.0	7.6	7.2	3.2	4.8	2.0	8.4	10.8
5	13.6	6.4	8.0	4.4	2.4	0.8	12.4	13.2
4	11.6	6.0	8.4	6.8	2.8	2.0	16.4	7.2
3	8.0	5.2	10.0	3.6	2.8	0.8	14.0	5.6
2	6.8	8.0	12.0	1.6	3.2	0 8	9.6	3.2
1	2.0	4.8	7.2	1.6	4.0	0.4	8.4	3.2
0	3.2	3.6	9.6	6.4	7.2		10.4	2.4
Mean score	5.17	7.64	5.05	9.18	9.64	12.00	4.15	6.39

[1] The maximum scores possible in the various tests are indicated by heavy lines drawn in the respective columns in the row next above that of the maximum score—e. g., the maximum score in 1 is 10, in 2 is 16, etc.

The desirability of some change designed to increase the difficulty of the tests at the upper end seemed evident. Since changes in the blanks were not feasible at the time, the only method which suggested itself for securing this increase in difficulty was an alteration of time limits. Accordingly the following tentative changes were suggested on the basis of inspection of the correlation plots for the several tests:

Beta test	1	2	3	4	5	6	7	8
Time limit first assigned (in minutes)	2½	3	2	2	3	5	3	
Suggested time limit (in minutes)	2	2½	1¾	2	3	3	2½	

In the hope that these changes might help to reduce slightly the number of high scores, they were incorporated in instructions issued for an experimental trial of beta with unselected groups. Eventually they were issued in the Examiners' Guide as the standard time limits for beta.[1]

Comparison of groups born in English-speaking countries with those born in non-English-speaking yielded results which tended to support the inferences suggested by the data from beta-only and beta-from-alpha groups, respectively (see p. 380)—namely, that the men handicapped by language difficulties were not the ones who profited most conspicuously by taking beta. Table 50 shows the percentages, making given scores in beta, of men who had either made E in alpha or had been eliminated from alpha. Table 48 has shown that, while this group includes only 13.1 per cent of English-speaking total, it includes 69.2 per cent of all the non-English speaking cases. Inspection of the percentage distributions shows the non-English-speaking to be distinctly inferior to the English-speaking group in their rating by beta, as does also reference to the means of the two groups:

Mean (English-speaking) $=101.6 \pm 1.35$.
Mean (non-English-speaking) $= 77.8 \pm 1.54$.

[1] No evidence was obtained regarding the exact effect of these changes. Inspection of results with the new time limits indicated that they had not been greatly affected by the change, either in the direction of improvement or loss. The changed time limits were retained in the permanent instructions mainly because the later modifications of beta, which were adopted, were based on data for which these limits were used, and because further experimentation on time limits was not feasible.

TABLE 50.—*Percentage distributions in beta of men who either made E in alpha or were eliminated from alpha, classified on basis of probable language handicap and schooling.*

Beta weighted score.	Letter grade.	Non-English speaking.	English-speaking.		
			Total.	Fourth grade and below.	Fifth grade and above.
210–214					
200–209	A				
190–199					
180–189					
170–179	B		0.8 0.8		1.4 1.4
160–169			2.4	1.8	2.8
150–159		0.8	3.2	3.6	2.8
140–149	C+	1.6 2.4	4.8 10.4	2.7 8.1	6.4 12.0
130–139		5.2	9.2	9.1	9.2
120–129		5.2	9.6	7.2	11.4
110–119		6.3	12.4	10.0	14.2
100–109	C	7.8 24.5	10.0 41.2	10.0 36.3	10.0 44.8
90–99		7.1	9.2	9.1	9.3
80–89	C–	8.2 15.3	10.4 19.6	7.2 16.3	12.9 22.2
70–79		7.1	9.2	14.6	5.0
60–69		11.6	8.4	10.0	7.2
50–59		8.6	6.0	7.3	5.0
40–49	D	7.1 34.4	2.8 26.4	3.6 35.5	2.1 19.3
30–39		7.9	0.4	0.9	
20–29		6.4	0.8	1.8	
10–19		6.7			
0–9	E	2.2 23.2	0.4 1.6	0.9 3.6	
Number of cases		267	250	110	140
Mean ± P. E.$_m$		77.8 ±1.54	101.6 ±1.35	95.2 ±2.14	106.6 ±1.69
Standard deviation		37.3	31.7	33.2	29.6

Two interpretations of these facts seem possible: Either (1) this non-English speaking group, making up two-thirds of all non-English cases appearing in the regular run of a draft group, is appreciably inferior to the English-speaking group with which it is compared, and which constitutes 13 per cent—presumably very nearly the lowest 13 per cent—of the general run of English-speaking cases, or (2) the non-English-speaking individual is penalized to some extent in beta, even though not to the same degree as he is in alpha.[1] Adequate data were never obtained for solving the problem here presented, the obvious difficulty being the lack of other satisfactory measures for this group with which to compare their beta scores. If the second of the above assumptions were accepted, the natural implication would be that a more lenient scale of grades should be drawn up for use with non-English cases. In the absence of satisfactory information regarding the status of the non-English group no such scale was attempted. The further point might be urged that these men are probably handicapped for army purposes by the same factors which influence their scores in beta. An attempt to size up, with a high degree of fairness, the real native ability of these cases becomes therefore a more or less academic problem for this situation, though it may become a matter of importance under other conditions.

Of interest also in this connection is the comparison of English-speaking cases of fifth-grade schooling or more with those of fourth-grade schooling or less in cases where both groups have failed to make a grade above E in alpha. These data are also shown in Table 50. Again it appears that, whether we consider the distributions or the central tendencies, the evidence runs counter to the assumption that the group supposedly most handicapped by external circumstances makes the most extensive gain in beta. For this problem, as for the preceding, further analysis was not possible. Alternative interpretations, similar to those offered for the preceding problem, are evidently in place.

It has been stated that results obtained with these data from Camp Custer were valuable chiefly as suggestive and as pointing the need of further information. This was especially true in so far as their bearing on the establishment of letter grades for beta was concerned. The Custer data, as well as reports from other camps, had given the impression that beta was

[1] No assumption is made in the above statement that language difficulty is the main factor of importance in this comparison. There is some evidence that groups characterized by complete illiteracy based on entire lack of educational opportunity show similar results. This factor may obviously operate in conjunction with language handicap.

in the main far more lenient than alpha, at least for the English-speaking cases who were referred to alpha in the regular course of camp routine. It was felt, however, that no reestablishment of grades for beta should be made without securing data on more unselected groups extending over the whole range of the scale. Such a group was accordingly obtained and furnished the basis for the final changes made in beta and in the assignment of letter grades. Since evidence was accumulating to the effect that alpha was probably scaled too severely, this group was also made use of in adjusting the alpha grades. An account of the main facts of this investigation in so far as it bore on the standardization of beta follows.

SECTION 3.—*Special investigation on relatively unselected group.*

To obtain the desired data a request was sent to 12 camps that approximately 100 relatively unselected men in each camp be given alpha, beta, and individual examination. Preference was expressed for Stanford-Binet as the form of individual examination to be tried, in order to secure a uniformity of data for comparison since it was recognized that Stanford and Point Scale mental ages were not interchangeable. No attempt was made to include the Performance Scale in the present comparison.

In response to the request data were received from nine camps, which constituted the main basis of the present study. Table 51 shows the numbers of cases who had had all three examinations—alpha, beta, and Stanford-Binet—classified according as they were born in English-speaking or in non-English-speaking countries.

TABLE 51.—*Number of cases received from various camps, examined by alpha, beta, and Stanford-Binet.*

Camp.	Born in English-speaking countries.	Born in non-English-speaking countries.	Total.
Custer	64	17	81
Dix	93	12	105
Jackson	102	0	102
Lee	105	16	121
Meade	91	0	91
Pike	67	1	68
Upton	54	26	80
Wadsworth	41	5	46
Wheeler	36	18	54
Total	653	95	748

Though each camp was requested to send data on an approximately unselected group, it was recognized that a genuinely unselected group could not be secured by any such method. In the first place, the group chosen in any given camp can not be thought of as typical of the camp; and in the second place, there was the selection involved in the choice of camps. Nevertheless there was no such selection of low-grade cases as that involved in the usual beta groups.

The major part of the work was done with reference to the English-speaking group of 653 cases. The reason for this choice was the fact that this is the only portion of the group for whom the alpha and Stanford-Binet examinations can be considered reasonably satisfactory. It seemed, therefore, that estimates of the validity of examination beta, which had for their points of reference these other two forms of examination, must be based on cases without serious language difficulty. It was assumed that beta should justify its value in application to English-speaking subjects at least. Further adjustments to meet the special problems of non-English-speaking cases might be accomplished later. This latter problem was not faced in the present study, partly because of the small number of such cases and partly because of the lack of standards of reference.

Hereafter, to avoid circumlocution, the terms "English-speaking" and "non-English speaking" are used to distinguish these two groups from one another on the ground of birthplace.

Since no external standard was available for determination of the value of beta as a measure of intelligence, it was necessary to evaluate this examination by comparison with the two measures already in use, namely, alpha and individual examinations. It seemed reasonable that beta

should be thus evaluated, since it was the least standardized type of examination of those included in the army series. Data were later obtained from other groups regarding the relationship of each of these examinations with officers' estimates of their men (see pp. 425 ff), but it seemed impracticable to attempt to secure these at this time.

One point of special practical importance in connection with this relationship is the question of the dividing line between D and E grades in beta. Because of the rule to recall E beta cases for individual examination, it was important that cases recalled by beta should include those likely to be rated as very low grade by individual examination but not those likely to be rated above the questionable range. It was also a matter of practical importance that too large a number should not be recalled.

Relationship between beta and alpha.—The correlation table[1] for beta and alpha, total weighted scores, was plotted and the Pearson product-moment coefficient found to be 0.806 ± 0.009. Inspection of the table showed the relationship to be clearly curvilinear. The correlation ratio which would represent the relationship more fairly, was not, however, computed for the present data; later it was figured for the correlation between alpha and beta raw scores, where it was found to be only slightly higher than r (see p. 392).

Inspection of the table showed that the curvilinear relationship was partially due to "jamming" of alpha cases at the lower end. There is evidently a marked tendency in alpha for the piling up about the lower limit, of cases, many of whom would trail off toward a lower point if the scale extended further down. This tendency shows more clearly for this group than for the alpha groups ordinarily reported from the camps, because of the fact that we include here some cases of the type which the camps have endeavored to exclude from alpha, even though we have not included any non-English-speaking cases. The account of the development of segregation methods (see p. 347) makes it clear that the purpose of segregation became largely the very practical one of preventing call of a man for two examinations. Accordingly the attempt was to exclude from alpha as many as possible of the men who could be expected to make such low scores that they would need to be recalled for beta, whether this failure was due to illiteracy proper or to low-grade intelligence. Such cases have not been thrown out from the present groups.

Reference to the distribution showed also a marked tendency on the part of beta toward massing cases at the upper part of the scale. This does not show actual jamming against the perfect score, as does the alpha distribution against zero score; the piling up appears to be accounted for, in part at least, by the large number making perfect scores in the separate tests. (For distributions in the separate beta tests see table 52). This fact is important since it results in making beta a less satisfactory test than alpha for high-grade cases in spite of its superiority to alpha for low-grade cases.

For practical purposes the type of discrepancy between alpha and beta scores, noted above, was not necessarily of great importance since assignment of letter grades might be made in such a way as to correct for these differences. If given grades mean the same whether assigned for alpha or for beta the main requirement has been met, since the grades and not the scores were reported to army officials. The following figures show the percentages of the group of 653 English-speaking cases making various grades by the two scales.[2]

[1] To prevent unnecessary duplication this table is not presented because of its similarity to table 56, which shows the correlation of alpha and beta raw scores (q. v.).

[2] The basis for assignment of grades at this time (prior to July, 1918) was as follows:

Scale.	E	D	C−	C	C+	B	A
Alpha weighted score	0–49	50–99	100–129	130–189	190–229	230–279	280–412
Beta weighted score	0–39	40–79	80–99	100–139	140–169	170–199	200–219

Percentages making grade.

Scale.	E	D	C−	C	C+	B	A
Alpha	24.0	22.7	9.5	22.3	9.8	7.8	3.8
Beta	[illegible]	15.8	10.2	24.3	28.8	13.0	1.7

Discrepancies in proportions given E grades by the two scales may be disregarded, since alpha was understood to be unreliable for this portion of the scale. The table shows, however, that there is marked discrepancy throughout the range, and that, except for grade A, the discrepancy is always in the direction of greater leniency for beta. Summarizing the data, it appears that 15.3 per cent make A or B on beta as compared with 11.6 per cent on alpha; that 68.4 per cent make C or better on beta as compared with 43.7 per cent on alpha; and that 78.6 per cent make C − or better on beta as compared with 53.3 per cent on alpha. The outstanding fact from this evidence is that grades on alpha and on beta were far from meaning the same thing at this time, and that the probability was that a man rated by beta would get a higher standing than one rated by alpha. Information received regarding regular draft quotas indicated that there was error in both scales; that alpha was too severe and beta too lenient. Alterations to accomplish a double adjustment—made in August in connection with additional changes in beta—will be discussed at a later point. A readjustment of alpha grades, made in July, reduced the degree of discrepancy slightly. Figures are not presented for this comparison, since the August changes represent the final ruling on grade standards.

Comparison of beta with Stanford-Binet.—The fact has been noted that beta apparently makes distinctions within a part of the scale which alpha entirely fails to reach. It is evident, therefore, that the adequacy of these distinctions must be judged by reference to some measure other than alpha. Comparison with Stanford-Binet is therefore of special importance for this portion of the scale, which is, for practical purposes, the part of beta which it is most important to have reliable.

The Pearson product-moment coefficient for the correlation between beta weighted score and Stanford-Binet mental age was found to be 0.731 ± 0.012. (It may be noted that correlations figured for four of the separate camp groups were found to be as follows: Dix, 0.740 ± 0.032; Jackson, 0.646 ± 0.039: Lee, 0.766 ± 0.027; Meade, 0.659 ± 0.040.) It is evident that these coefficients are not high enough to justify anticipation of a high degree of reliability of prediction. The table[1] shows a large amount of scatter at all points. In so far, therefore, as the intention was to secure, in beta, an instrument of group measurement which should produce results closely similar to those which the individual examination would have given, with great reduction in time, the results are disappointing.

The statement regarding the lack of certainty of prediction has special importance for its bearing on the dividing line between D and E in beta. Recognizing that an individual examination—in case of English-speaking men, either the Stanford-Binet or the Yerkes-Bridges point scale—furnished the main basis of decision with reference to low-grade cases, the following assumptions seemed justified:

1. It is important to recall all cases who would test under 8 years mental age if given individual examination.
2. It is desirable to recall the majority of cases who would test between 8 and 9 years.
3. It is desirable, if pressure of camp conditions be not too great, to recall at least a small number of cases who would test between 9 and 10 years.
4. It is desirable that few or no cases testing over 10 years be recalled.

In the present group of 653 cases there are 4 testing under 8 years, 22 testing between 8 and 9, 62 testing between 9 and 10, and 565 testing over 10 years. The dividing line of 40 (beta weighted score) recalls the following numbers:

Below 8 years, 3 cases (75 per cent of all cases below 8 years).
8 to 9 years, 10 cases (45. 5 per cent of all cases between 8 and 9).
9 to 10 years, 9 cases (14.5 per cent of all cases between 9 and 10).
Above 10 years, 14 cases (2.5 per cent of all cases above 10 years).
Total number recalled, 36 cases (5.5 per cent of total English-speaking group).

[1] This table is not presented, because of its close similarity to table 52, which shows the correlation of beta raw score with Stanford-Binet mental age (q. v.).

Obviously this is not a satisfactory situation, from the practical point of view, since 14 of the 36 cases recalled are not within the range which it is desired to recall, whereas 13 cases under 9 years, who are probably at least questionable cases whom the examiner should see, are missed. Reference to the scatter table for beta with Stanford-Binet made it clear that no way of shifting this line would make the situation satisfactory. Any adjustment would be a compromise between the desire to secure more low-grade cases and the intention to escape recall of cases above the questionable range.

That it may be clear that the situation as above described is not dependent upon the fact that the usual elimination on the basis of alpha had not been made, the following facts are submitted showing the results which would have been secured had an application of the usual system of recall been applied to this group:

Number recalled for beta from alpha, 118.
Number of recalled cases testing below 40 in beta, 30.
Mental ages of these 30 cases, by Stanford-Binet:
- Below 8 years, 3 cases (75 per cent of all cases below 8 years).
- 8–9 years, 9 cases (40.9 per cent of all cases between 8 and 9 years).
- 9–10 years, 7 cases (11.3 per cent of all cases between 9 and 10 years).
- Above 10 years, 11 cases (1.9 per cent of all cases above 10 years).

These results indicate that the same situation exists as that previously outlined, with merely a trivial reducing of numbers by the elimination accomplished by alpha.

For this situation there is no satisfactory solution, unless the relationship between Stanford and beta at the lower end of the scale can be improved. The best that can be done is to establish the dividing line arbitrarily to meet the exigencies of the situation in the camps, knowing that a shift in either direction would increase or decrease its efficiency, according as this is measured by the adequate recall of low-grade cases, or by the absence of excess recall of cases beyond the questionable range.

SECTION 4.—*Possibility of increasing the correlation between beta and Stanford-Binet.*

Since, therefore, the immediate practical need seemed to be for a higher degree of correspondence between results in beta and results in individual examinations for cases in the lower ranges of the scale, an attempt was made to determine, by means of a multiple correlation, the maximum possible correlation between beta and the Stanford scale, assuming appropriate weighting. If evidence could be found that an appreciable gain could be made by weighting of tests in accordance with results thus obtained, the intention was to determine the necessary weights of the various tests and also to ascertain what tests, if any, could be eliminated from the series without reduction in the degree of correlation.

Table 52 shows the correlation arrays for Stanford-Binet with the separate tests of beta. Table 53 presents the Pearson product-moment coefficients of correlation for each beta test with Stanford-Binet and with the other beta tests. From these figures partial coefficients were computed making possible application of Yule's formula for determining maximum correlation.[1]

Application of the formula gives the following results:

$R_{S(12345678)} = 0.74$, where $R_{S(12345678)}$ indicates the maximum correlation which might be obtained between Stanford(s) and the beta tests, indicated by the numbers in the subscript, by the best possible weighting. The above value (0.74) applies only to the present body of data.

Further application of the formula showed that considerable reduction in the number of tests used was possible without appreciable reduction in the amount of correlation, as indicated in the following figures:

$$R_{S/(34567)} = 0.74.$$

$$R_{S/(457)} = 0.73.$$

[1] Yule, G. U., Introduction to the Theory of Statistics, p. 248, formula 15.

TABLE 52.—*Showing correlations of Stanford-Binet mental age with scores in separate beta tests—English-speaking whites from nine camps.*

Beta test.	Score.	Stanford-Binet mental age.[1] 5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Number of cases.
Test 1. Maze.	10					1	1	4	2	6	6	11	8	9	10	2	60
	9					1	2	2	9	8	12	15	9	9	10	1	78
	8				4	9	11	13	19	14	15	13	16	15	7		136
	7				2	8	12	16	18	14	17	9	7	7	3	2	115
	6			1		6	11	11	6	14	13	9	5	5	3		84
	5				4	10	10	9	11	5	3	1	5	1			59
	4				1	12	8	4	8	2	4	1	2				42
	3				1	3	3	8	3	4	3						30
	2		1		1	8	3	1	5		2	3	2	1	1		28
	1		1			2	3	1		2	1						10
	0	1			4	2	2				1	1					11
	Number of cases	1	2	1	22	62	66	69	81	69	77	63	54	47	34	5	653

r (S–B with beta 1)=0.465±0.021 Mean (beta 1)=6.61 σ (beta 1)=2.37
Mean (S–B)=13.42 σ (S–B)=2.85

Beta test.	Score.	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Number of cases.
Test 2. Cube analysis.	16							1		2	4	3	4		6	1	21
	15							1	4	2	3	8	7	6	5		36
	14						2	1	2	6	4	7	5	9	13	2	51
	13						2	6	6	10	10	14	7	14	3		72
	12						6	2	8	6	13	3	9	3	5		55
	11					3	7	9	8	8	7	6	9	4	1		62
	10				3	1	6	6	6	6	4	5	4	6		1	48
	9					5	3	8	4	7	9	2	1	1			40
	8				2	7	4	9	4	4	7	5	1				43
	7				2	7	3	2	7	2	3	4	1	1			32
	6			1	2	3	2	6	6	1	1	1	2				25
	5				2	7	9	3	4	2	1	1		1	1		31
	4		1		3	3	3	7	4	3	1	1	1	1			28
	3				2	5	7	3	4	3		1		1			26
	2				2	5	3	2	5	2	4						23
	1				1	6	7	2	5	2	3	1	1			1	29
	0	1	1		3	10	2	1	4	3	3	1	2				31
	Number of cases	1	2	1	22	62	66	69	81	69	77	63	54	47	34	5	653

r (S–B with beta 2)=0.545±0.019 Mean (beta 2)=8.95 σ (beta 2)=4.56.

Beta test.	Score.	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Number of cases.
Test 3. X–O series.	12							4	5	4	5	10	10	6	12	2	58
	11						1	1	4	5	7	11	12	10	5	1	57
	10						4	5	14	15	15	14	16	17	12	2	114
	12					2	6	11	6	11	13	8	5	5	3		70
	8				1	1	5	7	8	6	9	5	3	1			46
	7				1	4	3	3	1	5	6			1			24
	6				1	3	1	5	4	10	2	1		4			31
	5					5	3	7	6	3	8	6	3	2			43
	4				1	4	9	4	5	3	2	1	2		1		32
	3				2	6	5	6	4		4	3	1		1		32
	2				4	16	11	5	9	2	2	1					50
	1				5	11	7	8	7	2	2	2	1	1			46
	0	1	2	1	7	10	11	3	8	3	2	1	1				50
	Number of cases	1	2	1	22	62	66	69	81	69	77	63	54	47	34	5	653

r (S–B with beta 3)=0.614±0.016 Mean (beta 3)=6.74 σ (beta 3)=3.92

Beta test.	Score.	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Number of cases.
Test 4. Digit symbol.	30									1	1	1	4	4	1		12
	29										2		1		1		4
	28											1			2		3
	27								2			1		1	4		8
	26									1		3	2	1		1	8
	25								1	4	3	4	2	1	1		16
	24									1	2	1	5	1	2		12
	23									3	1	2	3	3	2	1	15
	22							1				3	3	1	2		10
	21							1	1	1	3	4	7	5	2		24
	20								3	2	5	4	5	7	6	1	33
	19						1	2	3	2	7	3	1	2			21
	18						3	2	6	3	6	4		2	1	1	28
	17				1		3	3	6	1	2	5	2	4	3		30
	16					1	1	4	1	4	6	4	4	3	2		33
	15					3	3	1	2	10	7	5	3	2			36
	14					4	3	5	7	6	7	2	4	2		1	41
	13				1	4		6	4	3	7	3	1	2	4		35
	12					1	4	3	2	4	7	3	2	2			28
	11				1	4	2	5	6	4	1	3		1	1		28
	10					6	4	7	6	2	2	1		1			29
	9					2	6	7	3	2	2	1		1			24
	8					2	6	1	3	1	3	2	2				20
	7				1	8	1	3	5	1	1	1	1	1			23
	6				4		5	3	4	1			1				18
	5				1	1	4	5	1								12
	4				1	5	3	2	3	3		1					18
	3				1	4	6	4	2		1						18
	2				1	5	2	2	1	2		1					14
	1				2	5		1	2	3							13
	0	1	2	1	8	7	9	1	4	4	1		1				39
	Number of cases	1	2	1	22	62	66	69	81	69	77	63	54	47	34	5	653

r (S–B with beta 4)=0.639±0.016 Mean (beta 4)=13.35 σ (beta 4)=7.51.

[1] In original tables from which computations were made intervals of half-year mental ages were used. In the present tables 5 years mental age include 5 to 5.9; 6 years include 6 to 6.9, etc.

TABLE 52.—*Showing correlations of Stanford-Binet mental age with scores in separate beta tests—English-speaking whites from nine camps*—Continued.

Beta test.	Score.	Stanford-Binet mental age. 5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Number of cases.
Test 5. Number-checking.	25									1		2	2	1	3		9
	24								1	3	1	4	1	1	2		13
	23								3	2	2			3	3		13
	22							1	3	3	3	4	4	4	3	1	26
	21					1				2	2	3	4	2	4	1	19
	20							2	1	1	5	1	1	4	3		18
	19						2		1	6	7	5	7	6	3		37
	18					1	2	2	6	3	10	6	8	4	2	2	42
	17					1	2	4	3	2	4	7	9	2	2	1	37
	16					1	2	4	4	5	2	1	2	4	4		29
	15						1	5	6	6	11	7	3	5	3		47
	14					2	4	5	5	5	6	6	4	4			41
	13					2	1	3	3	3	4	6		1			27
	12					4	3	5	7	4	7	2	3	2			37
	11				2	6	2	4	5	2	1	2	2	1	2		29
	10				1	1	8	6	5	3	4	1	1	1			31
	9				1	5	4	6	5	1	2	1	1	1			27
	8					6	6	3	1	3		1	1				21
	7				1	3	4	6	4	4	3						26
	6				1	3	5	5	4	2	2		1				23
	5					1	4	1	2								8
	4				2	2	4			4		1					13
	3				2	5	1	1	3	1	1						14
	2				2	5	3	2	2					1			15
	1		1		3	4	1		1								10
	0	1	1	1	7	9	7	2	6	1	2						37
	Number of cases	1	2	1	22	62	66	69	81	69	77	63	54	47	34	5	653

r (S–B with beta 5)=0.622±0.016 Mean (beta 5)=12.86 σ (beta 5)=6.46.

Beta test.	Score.	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Number of cases.
Test 6. Pictorial completion.	20								2	1	1	2	1	2	3		12
	19							2			2	2	3	1	6	1	17
	18						1	2	1	1	2	4	3	4	5	1	24
	17							1	1	5	7	7	2	2	4		29
	16						1	4	9	5	10	12	10	8	3	1	63
	15					2	2	3	8	6	3	8	12	4	1	1	50
	14						4	4	5	8	8	6	7	9	3		54
	13				3	2	6	10	4	8	10	6	3	6	6		64
	12				1	2	2	4	7	7	14	4	3	4	2	1	51
	11					8	7	8	9	8	5	3	3	2	1		54
	10				1	6	10	5	6	4	6	2		2			42
	9			1		7	8	4	11	8	3	3	4	2			51
	8				1	11	8	8	9	3	2	3		1			46
	7				2	7	4	3	4	4	1		1				28
	6	1			1	6	4	6	1		1		1				21
	5				1	4	4	1									11
	4				4	2	3		1		1		1				12
	3				3	1	1	1				1					7
	2				1			1	2	1	1						6
	1				2	1			1								4
	0		2		1	3	1										7
	Number of cases	1	2	1	22	62	66	69	81	69	77	63	54	47	34	5	653

r (S–B with beta 6)=0.586±0.017 Mean (beta 6)=11.87 σ (beta 6)=4.24.

Beta test.	Score.	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Number of cases.
Test 7. Geometrical construction.	10						2		5	9	6	11	10	10	17	2	72
	9				1			4	2	5	18	11	11	16	5	1	74
	8					2	3	6	5	3	9	5	6	3	4	1	47
	7					3	4	2	7	4	9	6	9	6	4	1	55
	6					1	10	8	12	8	12	8	4	6	3		72
	5				3	5	7	11	16	18	8	6	6	4	1		85
	4				1	7	5	13	9	9	5	10	3				62
	3				2	8	10	6	5	4	3	1	4	2			45
	2				3	8	8	6	6	4	2	2					39
	1				5	12	7	5	9		2	1	1				40
	0	1	2	1	7	16	12	8	5	5	3	2					62
	Number of cases	1	2	1	22	62	66	69	81	69	77	63	54	47	34	5	653

r (S–B with beta 7)=0.610±0.017 Mean (beta 7)=5.37 σ(beta 7)=3.13.

Beta test.	Score.	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Number of cases.
Test 8. Spot pattern.	12						4	2	6	7	5	4	10	11	12	4	62
	11					1	2	4	7	8	16	14	9	9	10	2	82
	10					3	3	7	10	12	16	9	12	5	5	1	83
	9					4	1	4	6	12	10	13	6	6	2		64
	8				2	4	9	7	6	11	8	6	8	8	3	1	73
	7					3	4	12	11	7	9	8	1	3	1		59
	6				1	4	9	9	9	4	6	4	4				50
	5				1	8	7	7	10	1	4	1	1		1		41
	4				3	12	12	4	1	1	1	2	2	3			44
	3				2	9	2	4	3	3	1	1	1	1			27
	2			1	6	6	3	6	5	1	1	1					30
	1		1		1	5	6	2	1					1			17
	0	1	1		6	3	4	1	3	2							21
	Number of cases	1	2	1	22	62	66	69	81	69	77	63	54	47	34	5	653

r (S–B with beta 8)=0.572±0.018 Mean (beta 8)=7.49 σ(beta 8)=3.23.

TABLE 53.—*Correlations of beta tests with Stanford-Binet mental age and with each other (Pearson product-moment coefficients).*

Test.	Beta tests.							
	1	2	3	4	5	6	7	8
Stanford-Binet	0.465	0.545	0.614	0.639	0.622	0.586	0.610	0.572
Beta tests:								
1 Maze	.....	.477	.522	.514	.457	.490	.510	.476
2 cube analysis	.....	.....	.632	.576	.560	.556	.592	.551
3 x-0 series	.....	.....	.....	.689	.670	.584	.597	.619
4 digit symbol	.....	.....	.....	.....	.766	.654	.584	.695
5 number checking	.....	.....	.....	.....	.....	.619	.521	.703
6 picture completion	.....	.....	.....	.....	.....	.....	.555	.569
7 geometrical construction	.....	.....	.....	.....	.....	.....	.....	.559
8 spot pattern	.....	.....	.....	.....	.....	.....	.....	.....

As furnishing a basis of comparison it should be noted that $R_{S/\text{beta weighted}} = 0.731 \pm 0.012$, and that $r_{S/\text{beta raw}} = 0.728 \pm 0.012$. (The latter figures refer to raw score for the 8 tests, not to the later suggested form.)

The net result of the above considerations was to indicate two possible lines of development with a view to recommendations. The outstanding fact being that no appreciable improvement in the correlation between Stanford and beta would be achieved by any simple reweighting of tests, the following possibilities were considered:

1. The series might be reduced to the smallest number of tests from which the maximum correlation could be secured; the tests which contributed least might be eliminated and proper weights assigned to the remaining tests.

2. Since even the best weighting of tests affects the final correlation only slightly, all weighting might be eliminated. With elimination of weighting it would not be safe to assume, however, that the same amount of reduction in the number of tests could be accomplished without lowering of the correlation. A certain amount of reduction might be attempted empirically, following the indications of the partial correlation coefficient with regard to value for the series.

It was decided to follow the second line of development mentioned—namely, to try the effect of use of raw scores, with elimination of tests as suggested by the results of the partial correlations. The following variations were tried empirically, and results obtained as given below, raw scores being used in every case: (1) Elimination of test 8 (spot pattern); $r_{S/\text{beta}} = 0.726 \pm 0.012$. (2) Elimination of tests 8 and 2 (cube analysis), $r_{S/\text{beta}} = 0.723 \pm 0.013$. (3) Elimination of tests 8, 2, and 1 (maze), $r_{S/\text{beta}} = 0.723 \pm 0.013$.

These results indicate that dropping of tests 8, 2, and 1 could probably be accomplished without appreciable reduction in value of examination beta. Inspection of scatter tables indicates further that the lower portion of the scale is not affected adversely by the change. There remains, however, one objection to the change which seemed important enough to call for a more conservative recommendation—namely, the fact that our evidence is not certain proof that the correlations given above would have been obtained had the tests which appear early in beta been omitted. It is possible that they contribute sufficiently to the "warming-up process" so that they thereby increase the value of later tests. This argument obviously can not be applied in connection with 8 (spot pattern) since this is the last test on the blank. It seemed, therefore, entirely safe to recommend dropping this test.

Though we were not prepared to urge dropping of the other two tests, the evidence indicated that the numerical value of the maze (1) should be reduced. Since this could be accomplished quite simply, without involving the necessity of "weighting," by changing the scoring rules to read that one-half point should be given for each half maze correct, instead of 1 point, it seemed desirable to determine the effect of this change in conjunction with the dropping of test 8. This was, therefore, attempted and correlation with Stanford computed for the total English-speaking group with the following results:

$$r_{S/\text{beta suggested form}} = 0.727 \pm 0.012.$$

This shows no serious drop from the correlation of 0.731 ± 0.012 between Stanford and weighted score.

Table 54 presents the scatter table for Stanford with beta according to the method suggested. Inspection shows that this form handles the group at the lower end of the scale at least as well as does the weighted score. (This point will be discussed more fully in connection with the establishing of the lower dividing line for this method.)

TABLE 54.—*Showing correlation of beta raw score (suggested form) with Stanford-Binet mental age—English-speaking whites from nine camps.*

Beta raw score (suggested form).	Stanford-Binet mental age.[1]															
	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Number of cases.
110—118									1			1	1	3		6
105—109											1	1		4	1	7
100—106									1		4	3	3	6	1	20
95— 99									1	5	8	5	4	4	1	28
90— 94								1	1	3	4	6	12	5		32
85— 89							3	4	6	12	7	7	5	4		48
80— 84						1	2	9	7	8	11	6	9	3		56
75— 79						2	3	7	10	9	6	11	3	2	1	54
70— 74						4	7	5	10	8	4	4	3	1		46
65— 69					2	1	5	6	5	6	4	2	2	2	1	36
60— 64					3	5	7	7	5	11	6		1			45
55— 59					3	6	6	4	1	5	1	3	3			32
50— 54				1	1	6	9	6	8	3	3	1				38
45— 49				2	6	4	2	5	4	3		1				27
40— 44				3	9	9	6	5	1	2	1		1			37
35— 39				2	4	6	9	8	1		2					32
30— 34					11		3	3	1							18
25— 29					4	11	2	6	2	1		1				27
20— 24				3	8	4	4	1	2		1					23
				→			Dividing line for recall.					←				
15— 19			1	4	4	2	1		1							13
10— 14				3	4	4		4								15
5— 9	1	1		1	2	1			1	1						8
0— 4		1		3	1											5
Number of cases	1	2	1	22	62	66	69	81	69	77	63	54	47	34	5	653

$r = .727 \pm .012$.
Beta raw (suggested): Mean $= 62.8$ $\sigma = 25.7$.
Stanford-Binet: Mean $= 13.42$ $\sigma = 2.85$.

[1] In tables from which computations were made intervals of half-year mental ages were used. In the present tables 5 years mental age includes 5 to 5.9, 6 years includes 6 to 6.9, etc.

As further evidence that this is a safe change and that correlations are not determined mainly by some erratic quality of the total group, correlations were computed separately for each of four camps—Dix, Jackson, Lee, and Meade. Table 55 shows the correlations obtained with Stanford by the method under consideration and those obtained by use of the former method. In no case is there an important drop in the amount of correlation though there is for each a slight reduction.

TABLE 55.—*Correlations of Stanford with beta weighted score and with beta raw score (suggested form) for four different camps, English-speaking cases only.*

Camp.	Number of cases.	Correlation between Stanford and—	
		Beta weighted score (actual form).	Beta raw score (suggested form).
Dix	93	0.744 ± 0.031	0.740 ± 0.032
Jackson	102	$.649 \pm .039$	$.646 \pm .039$
Lee	105	$.784 \pm .025$	$.766 \pm .027$
Meade	91	$.671 \pm .039$	$.659 \pm .040$

As an additional check on the proposed change the correlation of alpha with the new form was computed. (Since it had been decided, on evidence from other sources, to use raw instead of weighted scores on alpha, raw alpha scores were used for this correlation. Since the correlation of raw with weighted alpha scores for this group is 0.994, change from weighted to raw scores

does not invalidate the comparison of correlations.) The correlation of alpha raw score with the proposed beta raw score was found to be 0.811 ± 0.009, as compared with 0.806 ± 0.009 for alpha weighted with beta weighted, again an inappreciable difference. The correlation array is shown in Table 56. It will be noted that this has the characteristics previously noted regarding the correlation of alpha weighted score with beta weighted (see p. 385). Because of the curvilinear relationship the correlation ratios were computed and found to be 0.847 ± 0.007 and 0.840 ± 0.008.

TABLE 56.—*Showing correlation of beta raw score (suggested form) with alpha raw score—English-speaking whites from nine camps.*

Alpha raw score.	Beta raw score (suggested form).																							Number of cases.
	0	1–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–118	
180–189																						1	1	1	3
170–179																				1					1
160–169																				1	1	3	1	1	7
150–159																				1	2	2			5
140–149																		2		4	5			1	12
130–139														1			1	2	2	2	2	4	2	1	17
120–129													1		1	1	1	1	5	4	3	2	2		21
110–119														1			3	4	3	2	5	1	4	1	21
100–109													1		2		5	1	6	3	2	2			22
90– 99												1			3	3	3	11	8	7		3			39
80– 89									1			3	2	4	4	5	14	8	4	1	4	2		1	53
70– 79							1		1			1	3	3	2	5	2	7	8	3	2				38
60– 69													4	4	8	7	8	10	7	3	2				53
50– 59							1		1	5	2	4	2	4	3	4	5	1	3						38
40– 49							3		2	2	3	5	5	8	3	10	5	5	2						53
30– 39			1		1	2	3	5	9	3	9	7	7	7	7	7	6	1							68
20– 29		1	1		2	3	5	5	8	6	9	6	8	1	1	4	1								60
10– 19			3	4	7	5	5	10	5	10	6		3	2											60
0– 9	5	7	10	9	13	12	5	7	8	3		1	2												82
Number of cases	5	8	15	13	23	27	18	32	37	27	38	32	45	36	46	54	56	48	32	28	20	7	6		653

$r = 0.811 \pm 0.009$ $\eta(xy) = 0.840 \pm 0.008$

$\eta(yx) = 0.847 \pm 0.007$

Beta raw (suggested): Mean=62.8 σ=25.7

Alpha raw: Mean=58.3 σ=12.4

As a final basis of comparison the effect of the change in beta on the non-English-speaking group was considered. For this group of 95 cases the correlation with Stanford was raised by the change; correlation of Stanford with beta weighted score was 0.680 ± 0.037, and for Stanford with beta (suggested form) 0.760 ± 0.030.

The results of the attempt to find a way of improving the correlation between Stanford and beta, or alpha and beta, by statistical manipulation of the tests may be summarized as follows: (1) It was concluded that no appreciable improvement in correlation could be secured by this method. (2) Considerable reduction in the number of tests used would be possible, but seemed precarious on the basis of present data alone. (3) Raw scores could be used without reducing the amount of the correlation appreciably. (4) Elimination of test 8 (spot pattern) could also be accomplished with no significant reduction in the correlation. Since this is the last test on the blank the other tests would not be affected by its removal. (5) Reduction in numerical value of test 1 (maze) by changing the scoring rules to make each half maze count one-half instead of one, seemed desirable, since results of the partial correlations indicate that test 1 contributes least of all the tests to the correlation. (6) The suggested form of beta showed no appreciable reduction in amount of correlation with Stanford, whether we consider the total English-speaking group, the groups from the various camps, or the total group from non-English speaking countries. It also showed no reduction in its correlation with alpha for the total English-speaking group.

This change was therefore recommended, which has the following as its main advantages: (*a*) It reduces the time required for beta by about ten minutes. (*b*) By eliminating weighting of tests it saves the time of the scorers, and also reduces the chance of error which weighting introduces. The recommended change was adopted and incorporated in the final edition of the

Examiners' Guide. It was put into effect in the camps through instructions issued August 8, 1918. The "suggested form" of beta is, therefore, the "final form" from point of view of the army situation.

SECTION 5.—*Establishment of letter grades for beta (suggested form).*

The fact of the special importance of letter grades for practical army purposes has been noted, as has also the fact of marked discrepancy in rating, as grades were first assigned for alpha and beta. With the adoption of the modifications in beta described above, it became essential that new letter grades be assigned. Since final revision of alpha grades was being made at this time no attention was paid to old relationships, but adjustments were made directly in the light of the proposed ratings for alpha. Assignment of grades on individual examinations was also made at this time.

It was assumed that we should aim to secure the highest degree of consistency possible between alpha and beta from C− on up through A: that discrepancy between alpha and beta for the D and E grades was to be expected; that these grades (D and E) must therefore be established mainly with reference to the individual examinations, and that moreover as a practical consideration it must be remembered that an E grade in beta means actually *recall* for final measurement by individual examination. Meeting these requirements involved a process of cutting and fitting to secure the greatest consistency. An additional arbitrary limitation was set up by the desirability of making the dividing lines between grades always multiples of 5 (e. g., 30 rather than 29, 85 rather than 83, etc. This was important for its bearing on the clerical work of the camps, since it was considered that greater accuracy of work was secured if more irregular points were not introduced.

As a result of the cutting and fitting process new grade bases were adopted, issued August 8, and incorporated in the Examiners' Guide (see Pt. I, p. 153). (Substitution of the D-grade for E was also made at about this time, but it has no bearing on the relationship discussed here.) Table 57 shows the percentages located in the various letter grades by each of the examinations, in accordance with the new assignment of grades. In addition to the total English-speaking group figures are offered for two types of subgroups included in the total—viz. the Meade and Dix groups on one hand and the Jackson and Lee groups on the other—as representing camps with large percentages of high-grade and of low-grade cases, respectively.

TABLE 57.—*Percentages making given grades on alpha, beta, and Stanford, by grade standards, as finally assigned English-speaking cases.*

Grade.	Total group.			Dix and Meade.			Jackson and Lee.		
	Alpha.	Beta.	Stanford.	Alpha.	Beta.	Stanford.	Alpha.	Beta.	Stanford.
A	5.8	5.1	6.0	6.0	5.4	5.4	2.9	2.4	3.4
B	8.9	9.2	11.9	11.4	11.4	12.0	3.9	4.8	5.3
C+	18.2	15.9	13.2	22.8	22.8	10.9	8.6	7.7	10.1
C	21.3	20.8	22.4	31.0	27.2	27.2	14.5	12.6	21.7
C−	19.3	21.8	23.0	17.9	22.3	26.6	20.3	26.6	24.2
D	8.4	21.0	15.6	4.3	9.8	13.0	13.5	33.3	22.2
D−	18.1	6.3	8.0	6.5	1.1	4.9	36.2	12.6	13.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of cases	653	653	653	184	184	184	207	207	207

From inspection of this table it is evident that from the grade of C− on there is a much higher degree of consistency between beta and alpha grades than there was by the old assignment of letter grades. The two subgroups are offered as an indication that this approximate consistency is not determined solely by the fact that grades were adjusted to the needs of the total group. Considering the total group, we note the following percentages: (1) Making A or B grades, on alpha, 14.7 per cent; on beta, 14.2 per cent; (2) making grades of C or above, on alpha, 54.2 per cent; on beta, 51 per cent; (3) making grades of C− or above, on alpha, 73.5 per cent; on beta, 72.8 per cent. A similar degree of consistency holds for alpha and beta for the two subgroups. Stanford deviates slightly more from the other two examinations,

but this is a matter of less importance, since relatively few cases are graded on Stanford and grades are ordinarily assigned mainly in the lower ranges.

Considering the dividing line between D and E with a view to its efficiency in recall of cases for individual examination we note, by reference to table 54, that the same difficulties appear in establishing this dividing line as we found with reference to present weighted score (see pp. 386ff), viz, that we must either recall too few whom we want or too many whom we do not want.

The dividing line of 20, which was adopted, recalls the following numbers as distributed by Stanford mental age:

Below 8 years, 4 cases (100 per cent of all cases below 8 years, M. A.).
8 to 9 years, 11 cases (50 per cent of all cases 8 to 9 years, M. A.).
9 to 10 years, 11 cases (17.7 per cent of all cases 9 to 10 years, M. A.).
Above 10 years, 15 cases (2.7 per cent of all cases over 10 years, M. A.).
Total number recalled, 41 cases (6.3 per cent of total English-speaking group).

Comparison with the figures given on page 387 for the present dividing line of 40 (weighted score) shows that while the suggested dividing line of 20 (suggested raw score) recalls a few more cases, the increase is mainly due to the addition of cases who tested low on Stanford and whom it was desirable to recall.

Any reduction below the point of 20 seemed unsafe, since it would mean missing too many cases in the dubious range who should be seen, if possible, before being passed upon.

SECTION 6.—*Summary.*

The following modifications, all of which are incorporated in the final edition of the Examiners' Guide, were made in beta after its first introduction into the scheme of camp examining:

1. Slight changes in procedure recommended by the camps were introduced.

2. Time limits on five of the beta tests were reduced as a result of inspection of distributions of men making low scores in alpha.

3. Test 8 (spot pattern) was dropped on the basis of evidence to the effect that it could be dropped without appreciable lowering of correlation between beta and Stanford-Binet.

4. Raw scores were adopted, since their use meant both a saving of time for the scoring units and a decrease in probability of errors and since their use involved no appreciable reduction in correlations with either the Stanford-Binet scale or alpha.

5. The numerical value of test 1 (the maze) in the total was reduced by giving one-half point instead of one point for each half maze correct. This change was due to the evidence from correlations to the effect that this was one of the least satisfactory tests of beta; also because inspection of tables showed that many low-grade men as measured by other standards made very good scores in the maze, thereby raising their total scores unduly and contributing to the difficulty of establishing a satisfactory lower dividing line.

6. New standards for assigning grades were established which increased the consistency of grades as assigned on beta and on alpha.

The main conclusions based on this more extensive trial of beta were as follows:

1. Beta evidently constitutes an important addition to the series of examinations for recruits for the following reasons: (*a*) It helps to compensate for the fact that alpha becomes rapidly too severe at the lower end of the scale, since beta makes discriminations below the zero point of alpha. (*b*) It affords a possible method of examining men who are illiterate in English, whether foreign or native born. For this purpose it is at least far more satisfactory than alpha.

2. Beta is a distinctly easier type of examination than either alpha or the Stanford scale. For the total English-speaking group of 653 cases the mode falls in the upper part of the scale and quite near to the upper limits of beta. In other words, there is no trailing off, such as alpha shows, at the upper end. This results in making beta less discriminating than alpha for the upper portion of the scale.

3. There are indications to the effect that individuals handicapped by language difficulty and illiteracy are penalized to an appreciable degree in beta as compared with men not so handicapped, although this is far less true for beta than for alpha. Further evidence is needed on this point.

4. Beta in its present form is quite unsatisfactory as an instrument of selection of cases for individual examinations. Its efficiency from this point of view is measured by the degree to which it succeeds in recalling cases who will be considered low-grade mentally on the basis of the individual examination and in not recalling in any considerable numbers cases who will be classified by the individual examinations as high grade. Reference to the scatter table of beta with Stanford makes clear the difficulty of drawing a satisfactory lower dividing line in beta for recall to individual examination. The present dividing line of 40 weighted score recalls 36 cases, or 5.5 per cent, of the total English-speaking group. Of these, 22 are below 10 years mental age as measured by Stanford and 14 are above 10 years, whereas 13 cases under 9 years are missed. Any attempt to remedy the situation results either in recalling too many cases who are not open to serious question as low-grade cases or in missing too many who should at least be considered for rejection or for a development battalion.

5. It appeared that no reweighting of tests could be made which would produce an appreciable improvement in beta either from the point of view of its application to the whole range of abilities or from the point of view of its use as in instrument of selection of low-grade cases.

In connection with the above statements regarding inability to make actual improvement in beta it should be remembered that no changes which would affect the blanks were contemplated at this time. With opportunity to experiment with changes in the actual content of the tests, it is entirely possible that an improved test of the beta type might have been constructed. Among other changes, further adjustment of the time limits might have been made to the advantage of certain of the tests.

CHAPTER 8.

REVISION OF METHODS OF INDIVIDUAL EXAMINATION.

SECTION 1.—*Original group of methods for individual examination.*

Except at Camp Devens the tests originally proposed for individual examining had only the briefest trial. At the other camps they were early abandoned in favor of the Yerkes-Bridges, Stanford-Binet, and Pintner-Paterson scales. This action appears not to have been due primarily to unsatisfactoriness of the tests, considered individually, but rather to the fact that they were not welded into a systematic scale or group of scales. The 22 tests were intended as the raw material for at least three scales, which were to be developed and standardized as a result of camp experience. That this expectation was not fulfilled was due to the necessity of securing results which could be immediately interpreted in the light of generally known standards. Such a standard was mental age, and test scores which could not be readily translated into terms of this concept were unsatisfactory both to the psychological examiners themselves and to the neuropsychiatric officers to whom cases were continually being referred. There is no doubt, however, that a good system of tests could have been wrought out of the material which the committee brought together. Five of the non-language tests, in modified form, were later included in the performance scale.

The validity of the separate tests of the individual examination series is to a certain extent indicated by their correlations with total score of the individual tests combined. Unselected recruits were tested early in October, 1917, as follows: Camp Taylor, 107; Camp Lee, 131; Camp Devens, 70. These 308 men were given the entire series of individual tests except H (free association).[1] The tests were scored according to the supplementary directions given in Part I, pages 147ff.

The correlation of each test with total score of all the tests was computed for each of the three groups of data separately. The three correlations were then averaged. The correlations were computed by the method of unlike signs. The correlations were as follows:

Test.	Correlation with total score of the 20 tests (unlike signs).	Test.	Correlation with total score of the 20 tests (unlike signs).
A. [illegible]	.57	M. Absurdities	0.74
B. [illegible]	.57	N. Rhymes	.65
C. [illegible]	.58	O. Likenesses and differences	.70
D. [illegible]	.66	P. Ingenuity (Terman)	.62
E. [illegible]	.57	Q. Designs	.63
F. [illegible]	.64	R. Logical memory	.70
G. [illegible]	.66	S. Comprehension	.62
H. [illegible]	.74	T. Sentence construction	.59
I. [illegible]	.73	U. Arithmetical problems	.61
J. [illegible]	.71	V. Code learning	.65

It will be seen that all the tests except K (letter line) give a good correlation with the total score of the 20 tests. From point of view of size of correlation with the total, the best five tests are, in order vocabulary, disarranged sentences, absurdities, likenesses and differences, and logical memory.

At Camp Devens 114 men (mental ages 5 to 18) were given tests A, B, C, D, E, and G and in addition either the Yerkes-Bridges or the Stanford-Binet scale. Table 58 shows the correlation between mental age and total score for the five tests.

[1] Test F (Stenquist construction), though listed with the individual examination methods, was used mainly as a group method for testing illiterates. It is discussed in chapter 6.

TABLE 58.—*Showing correlation between mental age and six tests of the individual examination series (r=0.75).*

Total score on tests A, B, C, D, E, and G.	Mental age.																							
	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	12.5	13	13.5	14	14.5	15	15.5	16	16.5	17	17.5	18	Total.
230–239																							1	1
220–229																							2	2
210–219															1				1					2
200–209														1									2	3
190–199												1		1										2
180–189										1		1	1			2								4
170–179											2	1	1	1										5
160–169								2	1	1			1										2	7
150–159							3		1				1									1		6
140–149							2	2	2	2	2	1	1		1									13
130–139			1				3	1		2						1	1							9
120–129					1	2		4	2		2	2												13
110–119			1			2	3	2		1	1			1	1									11
100–109			2		1	4	1		1	1	1													11
90– 99			1	2		3	1	2			1		1											11
80– 89		1	1	1					1															4
70– 79		1	1			2																		4
60– 69		1				1																		2
50– 59		2		2																				4
Total.		5	7	5	2	14	13	13	8		9	5	6	4	3	3	1		1			1	7	114

For the first 83 of the above 114 cases the following Pearson correlations were found:

Mental age and total score of A, B, C, D, E, G	0.727
Mental age and total score of A, C, D, E	.634
Mental age and test A (cube construction)	.363
Mental age and test B (clock test)	.699
Mental age and test C (cube imitation)	.535
Mental age and test D (maze)	.582
Mental age and test E (form board)	.563
Mental age and test G (orientation)	.620
Group examination *a* and total of A, B, C, D, E, G	.715
Group examination *a* and total of A, C, D, E	.620

It will be noted that the above correlations (all Pearson) are high except that for cube construction.

The method of combining the tests of the individual examination series into a total score was arranged by Otis and is set forth in full in a supplement prepared by him for the Examiner's Guide (see part I, p. 149.) It was not ready for use until the latter part of November—a fact which strongly militated against the use of these tests in the critical period of the official trial of methods.

SECTION 2.—*Adoption of the Yerkes-Bridges point scale and the Stanford-Binet scale.*

The correlations yielded by the tests of the individual examination methods indicate that the 20 tests of the series could probably have been made the basis of at least two mental age scales—one for literate Americans, the other for illiterates and foreigners. In fact the method employed by Otis for combining the scores of the separate tests made it possible to use them in any combination, and mental-age standards for special combinations could have been established after a few months' use. The majority of examiners, however, preferred to use scales for which norms were available. Moreover, experience showed that the danger of coaching, which had been one of the chief reasons why special individual examination methods had been prepared, was practically negligible for the class of subjects taking such examinations. It was accordingly decided to substitute for the specially prepared series of tests the Stanford-Binet scale, the Yerkes-Bridges point scale, and a series of performance tests for foreigners and illiterates."[1]

The arrangement of these three scales for Army use was begun early in January, 1918, by Dr. Bridges. Abbreviated instructions for the use of the point scale and the Stanford-Binet scale were prepared, which consisted mainly of the actual words to be used by the exam-

[1] The Stenquist test was retained in the revised Examiner's Guide for use in special cases as a test of skill to supplement the regular individual examination. It was not used, however, and there is nothing further to report regarding it.

iner in giving the tests. These instructions, in mimeographed form, were sent to the camps in March and were later included in the revised Examiner's Guide. (See Part I, pp. 167ff.)

The point scale and Stanford-Binet gave general satisfaction for American-born subjects, except in cases of absolute illiteracy. Some examiners even preferred to test illiterate subjects by these scales, omitting those tests which presuppose a knowledge of reading and writing. The non-English-speaking were, of course, always tested by the performance scale. Apart from this restriction the examiner was free to use the three scales according to his preferences.

All were used as mental-age scales in the sense that a mental age was always determined. For the point scale the Yerkes-Bridges mental-age norms were used, instead of their Stanford-Binet equivalents. The performance-scale scores, however, were calibrated in terms of Stanford-Binet by equating equal percentile ranges.

It was planned that the point scale should be used without abbreviation, but that in the case of the Stanford-Binet only four tests per year group should ordinarily be given. The Stanford-Binet tests recommended are indicated by asterisks in the record blank on pages 271 to 274 of Part I. These are not always the same as the starred tests of the record blanks supplied by the Houghton-Mifflin Co. The selection for Army use was made with reference to diagnostic value, suitableness for illiterates, and economy of time. More than four tests per year were almost never given in the Army, and when Stanford-Binet mental ages are mentioned it should be borne in mind that these always refer either to the four test per year abbreviation or to another abbreviation, still more radical, to be described later.

The reliability of the abbreviated Stanford-Binet had been determined in pre-war work at Stanford University with several groups of subjects. For a group of several hundred male adults, including "hoboes," prisoners, and reform-school inmates, mental age based on three tests per year (four tests in year 12) correlated 0.96 with the mental ages of the same subjects based on the entire scale. The mental age range of this group corresponded closely to that found for soldiers, except that it had a somewhat larger proportion of low-grade cases. The corresponding correlation (between the two halves of the scale) for several groups of public-school children varied from 0.93 to 0.97. It is evident, therefore, that the reduction of the scale from six to four tests per year involves but slight loss of accuracy. An index of reliability based upon repeated tests had also been determined for the Stanford-Binet in pre-war investigations. Tests repeated within a few days or a few months usually show a correlation, in the case of fairly wide-range groups of school children, of 0.95 or better. The correlation remains considerably above 0.90 even when the earlier and later tests are separated by a period of three or four years.

Correlations of repeated tests with the point scale are not available, but there is no reason to suppose the results would differ greatly from those furnished by the Stanford-Binet, particularly in view of the fact that the two scales are composed largely of the same tests. The reliability of point-scale measurements is indicated by the high correlation of score on the alternate tests with score in the entire scale—namely, 0.95 or better for fairly wide-range groups. That which either scale measures is measured by it fairly reliably, according to present-day standards of reliability in mental measurement.

The reliability of the point scale, however, rapidly decreases in the range above 80 points—that is, above a mental age of 13 to 14 years. The Stanford-Binet fails to differentiate satisfactorily above the mental-age score of 17 or 18 years. In the absence of any appreciable amount of Army data based on examination of the same individuals by both of these scales, reference was made to the results obtained at the Laboratory of Social Hygiene on 259 delinquent women.[1] For this group the correlation between Yerkes-Bridges score (in points) and Stanford-Binet intelligence quotient was 0.872 (Pearson). However, the relationship was considerably curvilinear. The correlation ratios were found to be 0.894 and 0.904. In the table of equivalent scores (Examiner's Guide) point scale and Stanford-Binet scores are equated in terms of percentile ranks on the basis of these data.

[1] The correlation table appears in a report of findings now being prepared for publication by the Laboratory of Social Hygiene, Bedford Hills, N. Y.

SECTION 3.—*The performance scale.*

The tests which had been included in the original individual examination series for testing non-English-speaking subjects (tests A, B, C, D, and E) did not give satisfaction. Each had shown reasonably high correlations with other measures, but norms were lacking and the list did not seem to be sufficiently representative of the types of performance tests. Various substitutes had been used in the first four camps, particularly at Camp Lee, where large numbers were given the Pintner-Paterson tests. Some of these proved extremely useful, but it was decided to make a new selection of performance tests and to standardize them on Army subjects.

The choice of tests was made chiefly by Dr. J. W. Bridges and was based upon the following considerations: (1) That tests should be selected which require a minimum of language on the part of both examiner and subject; (2) that the scale should be composed chiefly of tests which had already been found satisfactory with soldiers; (3) that the scale should test a variety of mental functions; and (4) that the tests should be economical of time. Following are some of the reasons for the selections made:

1. *The ship test.*—This test proved valuable in pre-war work at Ellis Island.[1] It is in the Pintner-Paterson scale[2] and was used and recommended by Camp Lee examiners. The instructions were changed so as to allow the subject to see the completed picture for 10 seconds before the actual test. This was done in order to equalize the test for subjects who had previously seen a ship and those who had not; and also because the principle of demonstrating each test in some way was adopted throughout.

2. *The manikin and feature profile.*—(The manikin was devised by Pintner, the feature profile by Knox)[3]. These tests are also in the Pintner-Paterson scale[4] and were recommended by Camp Lee examiners. They were used together because they presumably test similar functions, the former at about the five-year level, the latter at about eight. No demonstration of these tests was necessary, because everyone has seen a man and a profile.

3. *Cube imitation (Knox)*[5].—The form and the problems now extensively tried out in the Army were used rather than the Pintner standardization[6]; but only one trial of each problem was allowed, instead of two. The scores on this test gave a satisfactory distribution and correlated well with the scores on the total individual examination in the first four camps. This correlation (Pearson) was almost as high for one trial as for two— e. g., 0.71 as compared with 0.80 in the case of 70 unselected men at Camp Devens.

4. *Cube construction (Goddard)*[7].—This test, which was test A of the old series, was highly recommended by examiners in all four camps. It gave a good distribution of scores and a fair correlation with the total of the old individual examination series. Parts (*d*) and (*e*) proved too difficult for inferior subjects and were dropped. Instructions were also modified to adapt the test to non-English speaking subjects.

5. *Form board (Dearborn)*[8].—This was test E of the old series. It had shown only fair correlations with total score of the old series, but it gave a satisfactory range of scores and was favored by a majority of examiners. For the present series it was modified by dropping part (*d*) and adapting the instructions to non-English speaking subjects. An attempt was also made to define more accurately what constitutes "a move."

6. *Memory for designs.*—This was test Q of the old series (Terman designs). It had yielded high correlations with total score of the individual examination series and had given general

[1] Knox, H. A. A Scale Based on the Work at Ellis Island for Estimating Mental Defect, J. of the Amer. Med. Assoc., vol. 62, 1914, pp. 741-747.
[2] Pintner, R., and Paterson, D. G. A Scale of Performance Tests, pp. 58-61.
[3] Op. cit., p. 744.
[4] Op. cit., pp. 53-58.
[5] Op. cit., p. 742.
[6] Op. cit., pp. 67-69.
[7] Goddard, H. H. J. of Educ. Psychol., 1917, pp. 176-178.
[8] Dearborn, W. F., Anderson, J. E. and Christiansen, A. O. Form Board and Construction Tests of Mental Ability. J. of Educ. Psychol. vol. 7, No. 8, pp. 448-449.

satisfaction. A more accurate method of scoring was devised and a demonstrational form prepared for use with non-English speaking subjects.

7. *Digit symbol.*—A test of this kind was specially recommended by examiners at Camp Dix, where it was found to correlate 0.78 with group examination *a* in the case of approximately 900 unselected men. It was also a well-proved test in pre-war work. The form of the test selected was that arranged by Otis for the beta group examination.

8. *The maze test (Porteus)*[1].—The Porteus mazes, adapted by Yerkes (test D, old series) had been extensively used in the first four camps and had given fair satisfaction. They were specially recommended by the Camp Dix examiners. They were, therefore, retained, but with improved scoring and with instructions modified so as to provide for a demonstration of part (*a*).

9. *Picture arrangement ("Foxy Grandpa" series).*—The picture arrangement test had been used by several investigators, pictures of the "Foxy Grandpa" series having been utilized by Miss Bowler, Whipple, and others. The pictures selected for the performance scale are far from satisfactory, but they were the best immediately available. Scoring offered some difficulty and the method adopted is not entirely satisfactory.

10. *Picture completion (Healy)*[2].—An earlier form of the picture completion test, also devised by Healy[3], had proved satisfactory in the Pintner-Paterson scale[4] and was recommended by the Camp Lee examiners. The form of the test chosen is the new Healy test, with the author's procedure and scoring.

Instructions for giving these 10 tests were prepared by Bridges, with suggestions from the camp examiners. The scale was then tried out at Camp Lee on 228 subjects, 200 of whom had scored D or E in group examination *a*. The remaining 28 were A, B, or C men. It seemed desirable to base the trial of the scale chiefly on data from the kind of subjects for whom it would ultimately be used.

The method of scoring adopted provided for the assignment of credit for both speed and accuracy. As a rule, however, no score for time was given unless a degree of accuracy approaching perfection had been attained. The result is, of course, that inferior subjects get their scores chiefly on accuracy, while the superior get a greater and greater percentage of their total scores for time. Furthermore, points were assigned for time and accuracy in such a way as to obtain something approximating a normal distribution of scores (see table 60). This was done, not so much because of any a priori assumption as to the distribution of the functions measured among this group of men, as because it seemed very probable that a large number of zero scores would indicate failure of the measuring instrument to register small differences in amount of the trait measured, and because a large number of perfect scores would most likely indicate an undue limitation of the scale at the upper end.

The method of weighting adopted was that provided by Otis for the tests of the old individual examination series—a method which made it possible to combine the scores of any number of tests into a total score. The median of each test was assigned 15 points, the upper quartile 20, the lower quartile 10, and other ranks corresponding scores. The maximum score on each test is approximately 30 (see p. 182 ff).

In order to determine what tests best represented the scale as a whole, correlation of each test (weighted score) with total score was computed. The figures obtained by the method of unlike signs were as follows:

1. Ship	0.61	6. Designs	0.73
2. Manikin and feature profile	.66	7. Digit symbol	.62
3. Cube imitation	.51	8. Maze	.64
4. Cube construction	.64	9. Picture arrangement	.71
5. Form board	.47	10. Picture completion	.71

[1] [illegible] Mental Tests for Feeble-Minded: A new Series. J. of Psycho-Asthenics, vol. 19, No. 4, 1915, pp. 200-213.
[illegible]

[3] Healy, W. A Pictorial Completion Test. Psychol. Rev., vol. 21, 1914, pp. 189-203.

[4] [illegible] Also Pintner, R. and Anderson, M. M. The Picture Completion Test. Educ. Psychol. Monog.

The correlation of total performance scale scores with examination *a* scores by the same method was 0.48; but the subjects were chiefly D and E men, and the agreement was higher in the case of the few A, B, and C men than for those who scored low in examination *a*. This is what we should hope to find if examination *a* is unfair to some of these subjects.

The selection of tests for a short performance scale was based partly upon time required for giving, satisfactoriness of scoring, etc. Tests 2, 4, 6, 7, and 8 were recommended as being the best combination, all things considered, but in order to preserve the adaptability of the scale examiners were left free to use such tests as seemed best for the particular case.

The method of equal weighting made it possible, when less than the complete scale was used, to obtain a probable total score by finding the average score for the tests actually used and multiplying by 10. Hence, only one table of norms was necessary. These norms were given in terms of percentile rank, but because of the selection of subjects they were only rough indications. The dividing line between men qualified for regular duty and those to be recommended for service organizations or development battalions, and the line between the latter group and those to be recommended for discharge, were determined by examining the performance scale distribution of men who had made D or E on the group examination and by estimating that about 10 per cent of these should be recommended for service organizations or development battalions and 5 per cent for discharge. This placed the dividing lines at 100 and 70 points, respectively. The latter value, however, proved to be considerably too high.

In practice the scale had obvious limitations. While it afforded a reasonably satisfactory basis for recommendation regarding a subject, the results could not be stated in mental ages. As these were almost always desired by the psychiatrists to whom inferior men were regularly reported, it was decided to secure data from which mental-age norms could be obtained. The examiners at each camp were accordingly requested to send in records of 5 to 20 men who had been given both the Stanford-Binet and the Performance Scale. The data sent in and used in the revision were chiefly from examinations of men who had failed in alpha, beta, or both, and included the following records:

1. Complete performance scale:	
(*a*) American-born subjects	134
(*b*) Foreign-born subjects and negroes	22
2. The recommended abbreviation:	
(*a*) American-born subjects	126
(*b*) Foreign-born subjects and negroes	39

All complete scale records were scored also for the short scale and for an eight-test scale (in which form board and picture completion were omitted). The complete scale records of foreigners were neglected and the short scale records of foreigners (61 in number, including 22 who had complete scale also) were used only for correlation with Stanford-Binet. There were not enough cases to establish foreign norms, but this proved to be unnecessary, for the scale appeared to be as fair to foreign as to American-born subjects. The data used in the revision were then as follows:

1. Complete performance scale records of American-born	134
2. Short performance scale records of American-born	260
3. Short performance scale records of foreign-born and negroes	61

Score distributions.—Distributions of performance scale scores and of Stanford-Binet mental ages for these subjects, and of performance scale scores for the 227 Camp Lee subjects tested in the earlier experiment, are shown in table 59.

TABLE 59.—*Performance Scale and Stanford-Binet distributions.*

Performance Scale.								Stanford-Binet.				
Scores.	(a)	(b)	(c)	(d)	(e)	(f)	(g)	Mental ages.	(h)	(i)	(j)	(k)
0-19	2	.....	2	2	14	1	.....	4-4.9	1	.....	3	.....
20-39	3	.....	7	9	19	3	.....	5-5.9	.....	1	4	2
40-59	15	1	24	16	37	6	7	6-6.9	1	.....	8	.....
60-79	18	4	13	13	33	11	10	7-7.9	9	2	25	12
80-99	9	2	11	8	22	12	21	8-8.9	22	4	38	10
100-119	9	5	14	11	28	12	26	9-9.9	21	5	58	20
120-139	11	2	15	15	25	5	37	10-10.9	24	5	51	9
140-159	12	3	16	5	15	2	42	11-11.9	12	3	17	3
160-179	9	1	14	11	17	3	39	12-12.9	10	1	12	2
180-199	20	2	9	10	12	2	25	13-13.9	7	.....	10	.....
200-219	10	1	8	13	14	2	11	14-14.9	10	.....	13	1
220-239	6	.....	1	7	8	1	6	15-15.9	3	.....	4	.....
240-259	8	1	.....	6	7	.....	2	16-16.9	7	1	9	1
260-279	1	.....	.....	7	8	1	1	17-17.9	3	.....	3	1
280-299	1	.....	.....	1	1	.....	.....	18-18.9	4	.....	5	.....
Total	134	22	134	134	260	61	227	Total	134	22	260	61

(a) Complete performance scale, American-born.
(b) Complete performance scale, Foreign-born.
(c) Eight test scale, American-born, same cases as (a).
(d) Five test scale, American-born, same cases as (a).
(e) Five test scale, American-born, all cases.
(f) Five test scale, foreign-born.
(g) Complete performance scale, Lee subjects.
(h) Stanford-Binet, American-born, same cases as (a).
(i) Stanford-Binet, foreign-born, same cases as (b).
(j) Stanford-Binet, American-born, same cases as (e).
(k) Stanford-Binet, foreign-born, same cases as (f).

Distributions of scores on each test for the Lee group and for the "revision" group are shown in table 60. The columns are designated by test and by group. In the case of the short scale tests separate distributions for foreign-born subjects are also given. It should be noted that each of these five tests distributes the foreign subjects in much the same way as the American born.

TABLE 60.—*Distribution of scores on each test.*

Scores.	2. Rev. A.	2. Rev. F.	2. Lee.	4. Rev. A.	4. Rev. F.	4. Lee.	6. Rev. A.	6. Rev. F.	6. Lee.	7. Rev. A.	7. Rev. F.	7. Lee.	8. Rev. A.	8. Rev. F.	8. Lee.	1. Rev.	1. Lee.	3. Rev.	3. Lee.	5. Rev.	5. Lee.	9. Rev.	9. Lee.	10. Rev.	10. Lee.
0	4	2	0	7	2	1	12	1	1	34	6	4	6	4	0	3	1	1	0	4	1	8	4	38	17
1	6	1	4	5	0	1	19	2	2	11	1	2	10	1	3	7	2	(1)	(1)	2	4	(1)	(1)	(1)	(1)
2	9	0	2	15	2	3	20	0	7	19	4	3	8	2	3	4	3	5	9	10	3	7	5	(1)	(1)
3	11	7	5	18	4	4	(1)	(1)	(1)	5	1	2	17	4	5	1	3	(1)	(1)	5	6	(1)	(1)	(1)	(1)
4	23	3	8	16	2	6	27	4	10	5	3	3	25	5	3	4	6	(1)	(1)	4	7	8	6	3	2
5	20	3	7	16	3	8	(1)	(1)	(1)	6	3	7	11	3	7	1	2	10	25	9	6	5	9	3	8
6	(1)	(1)	(1)	16	5	6	16	3	15	19	4	9	14	6	7	5	8	(1)	(1)	10	14	(1)	(1)	3	14
7	29	4	10	19	4	14	(1)	(1)	(1)	12	4	7	15	3	9	4	1	(1)	(1)	(1)	(1)	7	11	4	5
8	22	10	13	15	7	18	24	9	20	12	4	9	17	4	8	3	5	(1)	(1)	10	20	9	17	3	6
9	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	7	5	14	(1)	(1)	(1)	8	17	(1)	(1)	(1)	(1)	(1)	(1)	3	8
10	24	0	14	14	3	22	(1)	(1)	(1)	14	2	11	17	4	21	4	12	19	57	9	25	3	15	3	13
11	(1)	(1)	(1)	14	6	15	19	5	24	12	2	12	(1)	(1)	(1)	3	19	(1)	(1)	14	21	4	9	3	8
12	21	6	31	(1)	(1)	(1)	(1)	(1)	(1)	9	0	17	18	3	25	6	14	(1)	(1)	(1)	(1)	3	17	2	12
13	(1)	(1)	(1)	10	3	23	23	8	28	4	2	10	(1)	(1)	(1)	(1)	(1)	(1)	(1)	15	17	3	9	4	11
14	21	5	28	15	8	18	(1)	(1)	(1)	7	0	16	22	3	31	8	14	(1)	(1)	(1)	(1)	6	11	5	13
15	(1)	(1)	1	(1)	(1)	(1)	14	4	31	3	2	22	(1)	(1)	(1)	(1)	(1)	27	54	10	28	2	11	5	17
16	22	7	31	18	1	17	(1)	(1)	(1)	8	2	6	15	3	17	17	33	(1)	(1)	(1)	(1)	4	7	2	11
17	(1)	(1)	(1)	13	1	21	22	3	24	4	3	10	(1)	(1)	(1)	(1)	(1)	(1)	(1)	8	22	5	11	3	18
18	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	4	0	13	21	4	31	17	29	(1)	(1)	(1)	(1)	3	9	3	9
19	10	3	29	13	0	14	12	4	16	8	1	4	(1)	(1)	(1)	(1)	(1)	27	32	10	11	5	8	3	10
20	(1)	(1)	(1)	6	1	13	(1)	(1)	(1)	6	1	9	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	6	11	5	10
21	9	4	15	(1)	(1)	(1)	4	4	18	3	2	6	12	2	24	15	25	(1)	(1)	4	14	1	6	5	11
22	(1)	(1)	(1)	7	3	8	(1)	(1)	(1)	11	0	10	(1)	(1)	(1)	(1)	(1)	(1)	(1)	8	9	7	12	5	3
23	11	1	11	7	1	6	11	2	7	2	1	5	9	1	18	(1)	(1)	21	28	(1)	(1)	3	10	4	7
24	8	0	7	5	1	4	(1)	(1)	(1)	4	0	5	(1)	(1)	(1)	19	22	(1)	(1)	1	8	6	3	6	6
25	(1)	(1)	(1)	2	1	3	8	(1)	11	2	0	2	(1)	(1)	(1)	(1)	(1)	(1)	(1)	0	7	6	4	2	2
26			2	3	0	0	(1)	(1)	(1)	4	0	3	13			(1)	(1)	10	15	(1)	(1)	5	4	4	1
27	2	0	6	1	0	1	7	2	6	2	0	2	(1)	(1)	(1)	2	8	(1)	(1)	0	2	7	8	3	1
28	(1)	(1)	(1)	3	0	0	(1)	(1)	(1)	2	1	1	4	1	8	(1)	(1)	(1)	(1)	1	1	4	4	4	2
29	1	0	3	2	0	1	3	2	6	3	0	2	4	0	1	(1)	(1)	3	5	(1)	(1)	4	4	2	1
30	0	0	1	0	0	0	8	0	1	2	0	0	1	0	0	3	3	(1)	(1)	0	1	3	3	3	0
31	(1)	(1)	(1)	(1)	(1)	(1)	2	0	0	16	0	2	1	0	0	(1)	(1)	1	1	0	0	(1)	(1)	1	1
32	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	0	0	0	(1)	(1)	1	0	(1)	(1)	(1)	(1)	0	0
	260	56	227	260	55	227	260	53	227	260	54	228	260	559	228	134	227	134	226	134	227	134	228	134	227

Rev.=Revision group. A.=American-born. F.=Foreign-born. [1] No score possible.

The ship test (1) proved to be somewhat easier than the other tests. The distribution was skewed toward the upper end. The weighting was therefore changed so as to make it from one to two points more difficult in all except the extreme upper part of the scale.

The digit symbol test (7) was too difficult; but the large number of zero scores was no doubt partly due to the method of weighting. Raw scores from zero to five equaled zero weighted. The weighting was therefore changed so as to make the test one to two points easier at the lower end of the scale.

The picture arrangement test (9) had a rectangular distribution. A study of the method of scoring in this test showed that there is considerable probability of getting credit as a result of chance juxtaposition of cards. It therefore seems probable that if chance scores were eliminated the lower portion would approach zero as in the picture completion test (10). The test was really too difficult, but, nevertheless, it seemed advisable to reduce some of the chance scores by a change in weighting (increasing the number of zero scores). This new weighting still allows some credit for chance arrangement, but a more radical change might interfere too much with the scale norms.

Both tests 9 and 10 are too difficult for men who have failed in beta, and they can not be improved by weighting.

The remaining six tests of the scale—manikin and feature profile (2), cube imitation (3), cube construction (4), form board (5), designs (6), and maze (8)—give good distributions of scores for each group of subjects, and the original weighting is satisfactory.

The scoring and weighting finally adopted for each test are as given in the revised Examiner's Guide and in the performance scale record blank.

Mental-age rating.—Mental-age equivalents were obtained for the long scale (134 cases), for the eight test scale (134 cases), and for the short scale (260 cases). Since the norms for eight tests differed very little from those for the whole scale, only the long and short scale norms are given in the Examiner's Guide. The short-scale norms were derived from tests 2, 4, 6, 7, and 8; but since tests 1 and 3 are very nearly equal to these in difficulty, the same norms may be used with a minimum of error for any number and any combination of tests 1, 2, 3, 4, 6, 7, and 8. If eight or more tests are given the long scale norms should be used.

These mental-age equivalents were obtained by equating equal ranks in the performance and Stanford-Binet scales. Thus the mental-age equivalent for a given score is not necessarily the most probable mental-age for any individual making that score. To obtain this result the regression equation of Stanford-Binet mental age upon performance score would have to be used. However, since the relation of the different individual examination scales to army achievement is unknown, it may be assumed that each scale ought to give much the same result, in the sense that the number of men recommended for discharge or development battalions on the basis of the two scales should be approximately equal. This result is obtained by the method used in equating ranks.

Correlations.—Correlation arrays were plotted and Pearson product-moment correlations computed for long scale, eight test scale, and short scale scores with Stanford-Binet mental ages; for short scale with long scale scores; and for scores on each test with total performance scale scores and with Stanford-Binet mental ages. These calculations were based upon 134 cases, except in the case of correlation of scores on the short scale and its various tests with Stanford-Binet ratings. Here 260 cases were available.

The correlations of the separate tests with mental age ratings and with total performance scale scores are on the whole higher than expected. If the tests are arranged according to the degree of correlation, the following orders are obtained:

With Stanford-Binet.		With total performance scale.	
Digit symbol	0.777 (260 cases)	Digit symbol	0.881 (260 cases)
Designs	0.735 (260 cases)	Designs	0.858 (260 cases)
Picture arrangement	0.723 (134 cases)	Picture arrangement	0.858 (134 cases)
Manikin and feature profile	0.676 (260 cases)	Manikin and feature profile	0.830 (260 cases)
Ship	0.661 (134 cases)	Cube construction	0.819 (260 cases)
Maze	0.655 (260 cases)	Picture completion	0.815 (134 cases)
Picture completion	0.650 (134 cases)	Maze	0.788 (260 cases)
Cube construction	0.633 (260 cases)	Ship	0.768 (134 cases)
Cube imitation	0.597 (134 cases)	Cube imitation	0.661 (134 cases)
Form board	0.480 (134 cases)	Form board	0.606 (134 cases)

It will be noted that the first four and the last two tests are the same in both orders. The form board, by its low position, is indicated as probably the poorest test in the scale, and one that could therefore be dropped without loss. Inspection of the distributions showed that the picture completion test, while not one of the lowest from point of view of the above correlations, presented an unfortunately large proportion of zero scores (38 out of 134). Dropping these two tests (form board and picture completion) the total score on the remaining eight tests was determined for each of the 134 cases. These scores show a correlation with Stanford-Binet mental-ages of 0.834, while the complete scale scores correlate only 0.841 with the same ratings.

The five tests of the short scale seem to have been very well chosen. The picture-arrangement test, which has a high place in both orders above, was not included because of the time required to give it, and also because of its difficulty in the lower end of the scale. There seemed to be no reason for changing the other tests, except that for the absolutely illiterate (whether foreign or American born) the ship or the cube imitation tests should be substituted for the digit symbol, which gives a rather high percentage of zero scores.

The short performance scale gave the following correlations: Short scale with long scale (134 subjects), 0.97; short scale with Stanford-Binet (260 American born), 0.84; short scale with Stanford-Binet (61 foreign born), 0.70.

Tables 61, 62, and 63 give typical correlation arrays for performance scale and Stanford-Binet scores.

TABLE 61.—*Short performance scale and Stanford-Binet mental age.* ($r=0.842$).

		Mental age.															
		4–4.9	5–5.9	6–6.9	7–7.9	8–8.9	9–9.9	10–10.9	11–11.9	12–12.9	13–13.9	14–14.9	15–15.9	16–16.9	17–17.9	18–18.9	Total.
Short performance (five tests).	280–299															1	1
	260–279											1		3	2	2	8
	240–259										1	2	2		1	1	7
	220–239									2	3	1	1			1	8
	200–219						1	4	1	2	2	2		2			14
	180–199							1	5	1		2		3			12
	160–179					1	1	5	3	3	2	2					17
	140–159					1	1	7	1	2			1	2			15
	120–139					1	8	8	3	1	2	2					25
	100–119					5	11	9	1	1		1					28
	80–99				2	4	11	5									22
	60–79			2	2	10	12	6	1								33
	40–59				9	11	10	5	2								37
	20–39	1			9	5	3	1									19
	0–19	2	4	5	3												14
Total....		3	4	7	25	38	58	51	17	12	10	13	4	10	3	5	260

TABLE 62.—*Designs and Stanford-Binet mental age* ($r=0.735$).

		Mental age.															
		4–4.9	5–5.9	6–6.9	7–7.9	8–8.9	9–9.9	10–10.9	11–11.9	12–12.9	13–13.9	14–14.9	15–15.9	16–16.9	17–17.9	18–18.9	Total.
Score on test 6 (designs)	30–31									2			1	2	1	2	8
	28–29												1		1	1	3
	26–27							1			1	1	1				7
	24–25			1					1	1		1	1		1	2	8
	22–23						2	1	1	2	1	3		1			11
	20–21						1	3	2	2	1	2		2			13
	18–19						4	2	2	1	2			1			12
	16–17					3	1	7	1		1	3		3			22
	14–15					1	4	3	3	1		2					14
	12–13				1	5	7	11	1								23
	10–11					4	8	3		2	1	1					19
	8–9			1	3	8	8	4	4								28
	6–7					5	1	4									16
	4–5			1	2	4	11	8		1			1			1	27
	2–3			1	3	7		3	1								20
	0–1	3	4	4	12	4	2	1	1			1					31
Total....		3	4	8	25	38	58	51	17	12	10	13	4	9	3	5	240

TABLE 63.—*Form board and Stanford-Binet mental age (r=0.480).*

		Mental age.															
		4–4.9	5–5.9	6–6.9	7–7.9	8–8.9	9–9.9	10–10.9	11–11.9	12–12.9	13–13.9	14–14.9	15–15.9	16–16.9	17–17.9	18–18.9	Total.
Score on test 5 (form board).	28–29							1									1
	26–27																
	24–25															1	1
	22–23							1	1	1		1	1	1		2	8
	20–21						1				1	1		1			4
	18–19					[illegible]		3		2		1		2			10
	16–17						2	1	1		2			1		1	8
	14–15					2		2	2	1		1	1		1		10
	12–13					1	3	4	1	2	1	2			1		15
	10–11				2	3	5	5	3	3			1		1		23
	8–9					3	3		1		1			2			10
	6–7				4	1	2	1	1			1					10
	4–5				1	1	3	3	1	1	2	1					13
	2–3				2	5	2	3	1			2					15
	0–1	1		1		4											6
Total....		1		1	9	22	21	24	12	10	7	10	3	7	3	4	134

Further abbreviation.—In camp examining it was found that the recommended short scale (tests 2, 4, 6, 7, and 8) was still too long, requiring usually from 30 to 40 minutes. Analysis of the data gave rise to the short method described in the revised Examiner's Guide (Part I, p. 192). The order of procedure with the tests there indicated is based upon their separate correlations with total performance scale, and their consequent efficiency in reducing the number of complete examinations. Examination of the 228 records of the earlier Lee investigation showed that the following numbers would have been eliminated from further examination on the basis of the rules which were formulated: The rule excusing those who made 14 or more on digit symbol would eliminate 119 cases; 22 or more on two tests would eliminate 53 additional; 27 or more on three tests would eliminate 27 additional; 32 or more on four tests would eliminate 7 additional. This would leave only 22 subjects to take the complete examination. The time required for giving a performance scale examination was thus reduced to 15 or 20 minutes in the case of a majority of the subjects.

Camp studies.—In the camps several studies were made touching various aspects of the performance scale. It is possible here merely to indicate the nature of a few of these.

At Camp Greenleaf, on the basis of 150 examinations a regression equation of mental age upon short performance score was determined as follows: Mental age $=0.464+77.34$ months; or, more roughly, "mental age equals one-half performance scale score plus six years." The 150 subjects entering into this investigation ranged in mental age from 5 to 16 years, had been in the United States at least six years, and were all English-speaking. Their performance scale scores showed a correlation of 0.77 with mental age. (Stanford-Binet and point scale mental ages were thrown together, which probably lowered the correlation somewhat.)

At Camp Lee an abbreviated performance scale was worked out, composed of cube construction (parts (*a*) and (*b*)), designs (parts (*a*), (*b*), and (*c*)), and maze (parts (*a*) and (*b*)). Raw scores on these tests were used and mental age equivalents determined. The mean deviation of mental ages on this scale from mental ages on the whole scale for 273 cases was found to be 0.38 year, and the correlation of mental ages on the two scales, 0.85.

Numerous correlational studies were reported, but without more definite knowledge than is available regarding the exact nature of the groups on which these were based their meaning is doubtful.

At Camp Custer a comparison of the results for American and foreign-born subjects was made. The conclusion was reached that foreigners do relatively well in test 2 (manikin and feature profile), test 3 (cube imitation), and test 4 (cube construction); but that they are handicapped in test 7 (digit symbol) and still more in test 10 (picture completion).

At Greenleaf it was found that the proportion of zero scores in the maze test was reduced from 28 per cent in beta to 2 per cent in the performance scale, and that similarly zero scores in the digit-symbol test were reduced from 49 to 6 per cent.

An interesting contribution from Greenleaf was a Yiddish translation of the performance scale by Corpl. William Cohen.

Criticism.—Important criticisms of the performance scale were made by camp examiners regarding the method of scoring the various tests, the relative difficulty of the tests, the reliability of results with non-English speaking subjects, etc. As to scoring, the chief points made were that the scoring rule for test 1 was ambiguous; that the counting and evaluation of "moves" in tests 4 and 5 were unreliable; that the possibility of chance scores in tests 1 and 9 were too great and not adequately corrected in the weighting, etc. It was claimed that tests 10 and 7 (occasionally also 9 and 6) were too difficult, while test 1 was too easy; and that these differences were not sufficiently corrected in the weighting. The manikin and feature profile (test 2) was everywhere criticized as being inartistic and unrecognizable; nevertheless, results proved that this test is one of the best in the scale. The "pencil and paper" tests (6, 7, and 8) received an undue amount of adverse criticism, for analysis of the results shows that designs (6) is probably the best single test in the scale, that maze (8) is fair, and that digit-symbol (7) is very satisfactory for all subjects except the absolutely illiterate. The kinds of pictures used in tests 9 and 10, especially the former, were disapproved; but it was recognized that such tests would probably be valuable if a selection of pictures more suitable for adults were made.

On the whole the present performance scale, particularly the abbreviated form, gave satisfactory results, and with improvement along the lines indicated above it could be made a fairly satisfactory intelligence scale, both for literate and illiterate subjects. Tests 9 and 10 were not found practicable in the Army.

Section 4.—*Abbreviation of the Stanford-Binet scale.*

During the spring and summer of 1918 when 300,000 or more men were being drafted each month it was found impossible to give a complete individual examination to all who failed in the group examinations. Accordingly, abbreviations of the point scale, the Stanford-Binet scale, and the performance scale were prepared which could be applied in from 12 to 15 minutes. After September 1 these abbreviated scales were used for the majority of those individual examinations which did not present exceptional or puzzling features.

In the case of each scale the attempt was made to select for the abbreviated series those tests of greatest diagnostic value as indicated by agreement with the scale as a whole. The short series was intended to replace, for a certain proportion of subjects, the complete scale. It was therefore necessary that it should yield results as nearly as possible the same as would have been secured from the entire scale.

The data used included 486 examinations in which four tests per year had been used, usually the four-starred tests (see examination blank, Part I, p. 271). Of the 486 records, 324 were of unselected men who entered into the alpha-beta-Stanford experiment described in chapter 7. The remaining 162 records were sent in from various camps for use in the mental age standardization of the performance scale.

The distribution of these 486 cases according to mental age, as measured by the regular scale of four tests per year, is shown in the accompanying table. It will be noted that the limited number of cases at the lower mental ages renders the data unreliable for the tests below six years.

Table 64.—*Distribution according to mental age of subjects used in the abbreviation of Stanford-Binet scale.*

Mental age.	Number.	Mental age.	Number.	Mental age.	Number.
3.5–4.4	2	9.5–10.4	75	15.5–16.4	29
4.5–5.4	3	10.5–11.4	38	16.5–17.4	18
5.5–6.4	7	11.5–12.4	47	17.5–18.4	22
6.5–7.4	13	12.5–13.4	39	18.5–19.4	3
7.5–8.4	19	13.5–14.4	36	19.5–	5
8.5–9.4	76	14.5–15.4	33		

The selection of tests for the abbreviated scale was based upon the following considerations: (1) Diagnostic value; (2) order of difficulty; and (3) necessity of retaining tests which would give mental ages as nearly as possible identical with those based on the entire scale.

The diagnostic value of the tests for white soldiers is roughly indicated by rapidity of increase in the per cents passing at various mental ages. Table 65, which shows this for the various tests, presents interesting comparisons. Some tests show a very gradual, others a very rapid increase in number passing with mental age. Obviously, the more gradual the increase the more tests must be used to secure a reliable measure. It will also be noted that there is usually some particular mental level where a test shows the most rapid rise in number passing, above this level the increase being so slight that the diagnostic value of the test for this class of subjects becomes greatly reduced. Table 65 includes the total number of cases (486). All tests below those actually given a subject were considered to have been passed; those above the point where the examination ended, to have been failed. In comparing the figures of this table it should be borne in mind that below mental age 7 and above mental age 18 the numbers are much too small to be significant.

TABLE 65.—*Per cent passing each Stanford-Binet test at each mental age (white recruits).*

Test.	Mental ages (6=5.5 to 6.4, etc.).												
	6	7	8	9	10	11	12	13	14	15	16	17	18
V—2. Comparison of weights	100	100	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3. Aesthetic comparison	87	90	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4. Definitions	100	100	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5. Patience	81	100	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
VI—1. Right and left	100	92	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2. Missing parts	43	54	92	100	.....	.....	.....	.....	.....	.....	.....	.....	.....
3. Thirteen pennies	84	100	100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4. Comprehension	50	82	98	100	.....	.....	.....	.....	.....	.....	.....	.....	.....
VII—2. Picture description	29	76	55	88	99	100	.....	.....	.....	.....	.....	.....	.....
5. Differences	57	86	90	98	100	.....	.....	.....	.....	.....	.....	.....	.....
6. Diamond	67	61	79	95	100	.....	.....	.....	.....	.....	.....	.....	.....
Alt. Digits backward (3)	15	19	58	95	98	.....	.....	.....	.....	.....	.....	.....	.....
VIII—1. Ball and field	.....	31	50	88	91	92	98	.....	.....	.....	.....	.....	.....
2. Twenty to one	.....	32	58	91	97	100	.....	.....	.....	.....	.....	.....	.....
3. Comprehension	.....	61	84	98	100	100	.....	.....	.....	.....	.....	.....	.....
4. Similarities	.....	15	57	81	97	98	100	.....	.....	.....	.....	.....	.....
IX—1. Date	.....	15	60	91	97	98	100	.....	.....	.....	.....	.....	.....
2. Weights	.....	23	48	62	85	89	89	95	98	.....	.....	.....	.....
3. Change	.....	31	78	89	95	100	.....	.....	.....	.....	.....	.....	.....
4. Digits backward (4)	.....	.....	28	35	71	73	92	90	100	.....	.....	.....	.....
X—2. Absurdities	.....	8	20	42	80	75	96	95	94	97	.....	.....	.....
3. Designs	.....	.....	3	35	50	29	70	92	74	91	100	.....	.....
5. Comprehension	.....	8	20	54	83	71	94	100	100	.....	.....	.....	.....
6. Sixty words	.....	.....	8	15	40	35	63	79	88	87	100	.....	.....
XII—3. Ball and field	.....	.....	6	19	48	62	65	80	78	90	97	100	.....
5. Fables	.....	.....	.....	2	16	28	30	61	68	88	97	100	.....
6. Digits backward (5)	.....	.....	.....	5	8	23	37	41	71	82	92	94	100
7. Pictures	.....	.....	.....	4	28	50	42	78	78	67	90	100	.....
8. Similarities	.....	.....	.....	4	27	58	65	70	72	84	90	100	.....
XIV—2. Induction	.....	.....	.....	.....	3	20	44	68	69	79	89	94	96
4. Problems of fact	.....	.....	.....	.....	11	40	68	82	88	85	87	100	92
5. Arithmetical reasoning	.....	.....	.....	.....	4	6	22	54	65	73	87	100	.....
6. Clock	.....	.....	.....	.....	3	18	37	58	64	73	79	100	.....
XVI—2. Fables	.....	.....	.....	.....	.....	.....	2	17	15	35	53	94	91
4. Boxes	.....	.....	.....	.....	.....	3	20	22	45	53	69	100	89
5. Digits backward (6)	.....	.....	.....	.....	.....	3	6	5	28	39	61	68	69
Alt. Physical relations	.....	.....	.....	.....	.....	5	18	23	51	70	58	56	91
XVIII—2. Paper cutting	.....	.....	.....	.....	.....	.....	8	12	17	50	48	55	88
4. Abstract passages	.....	.....	.....	.....	.....	.....	.....	2	4	6	36	33	73
5. Digits backward (7)	.....	.....	.....	.....	.....	.....	.....	5	14	6	18	35	51
6. Ingenuity	.....	.....	.....	.....	.....	.....	.....	3	0	16	32	18	68
Number of cases at each mental age	7	13	40	76	75	38	47	39	36	33	29	18	22

Table 66 shows the order of difficulty of the tests based upon the number of men failing in each. The number passing and the number doubtful are also shown. It should be noted that the order of difficulty for soldiers differs considerably from that for school children; comprehension and making change, for example, are relatively much easier for adults, while the test of reversed digits is much harder for adults than for children of the same mental age.

TABLE 66.—*Tests in order of difficulty.*

Test.	Number failing.	Number passing.	Doubtful.	Test.	Number failing.	Number passing	Doubtful.
IV—5. Comprehension	0	486	0	X—5. Comprehension	117	369	0
3. Counts pennies	1	485	0	X—2. Absurdities	129	357	0
1. Compares lines	2	484	0	IX—4. Digits backward	146	339	1
4. Copies square	2	483	1	X—3. Designs	200	284	2
V—4. Definitions	2	484	0	XII—3. Ball and field	210	272	4
VI—1. Right and left	2	484	0	X—6. Sixty words	230	255	1
V—5. Patience	3	480	3	XII—6. Similarities	249	227	10
V—1. Comparison of weights	4	482	0	XII—7. Pictures	263	211	12
VI—3. Counts 13 pennies	4	480	2	XII—5. Fables	287	187	12
V—3. Aesthetic comparison	7	479	0	XII—6. Five digits backward	304	177	5
VI—4. Comprehension	12	474	0	XIV—4. Problems of fact	344	141	1
VII—5. Differences	13	473	0	XIV—2. Induction	359	109	18
VI—2. Missing parts	18	468	0	XVI—4. Boxes	359	107	20
VII—6. Diamond	23	461	2	XVI—A. Physical relations	365	114	7
VIII—3. Comprehension	26	459	1	XIV—6. Clock	377	108	1
VII—2. Picture description	40	444	2	XIV—5. Arithmetical reasoning	387	98	1
VII—A. Three digits backward	42	440	4	XVI—2. Fables	395	84	7
IX—3. Makes change	42	444	0	XVIII—2. Paper cutting	401	77	8
VIII—2. Counts 20–0	46	439	1	XVI—5. Six digits backward	402	82	2
IX—1. Date	52	434	0	XVIII—4. Thought of passage	438	44	4
VIII—4. Similarities	57	429	0	XVIII—6. Ingenuity	438	39	9
VIII—1. Ball and field	60	425	1	XVIII—5. Seven digits backward	444	38	4
IX—2. Weights	96	390	0				

Table 67 gives the abbreviated scale, the location of each test in the original Stanford-Binet, the number of soldiers who failed each test, and the average difficulty of the tests in each year group both for the abbreviated and original scales. It will be noted that an eleven-year group has been formed by the inclusion of one of the harder tests from year 10 and one of the easier from year 12. Probably a somewhat different selection would have been made had it been possible to base it entirely upon the diagnostic value of the tests. It was necessary, however, to select such tests and to give them such location as would cause the abbreviated scale to yield mental ages comparable with those based upon the entire scale. From a comparison of the last two columns in the following table it will be seen that the average difficulty of the two tests located in any given year is approximately the same as the average difficulty of the four starred tests of that year group in the original scale.

TABLE 67.—*Abbreviated Stanford-Binet scale.*

Original location.	Name of test.	Number failing.	Average of failures for the two tests of each year.	Average number failing on the four-starred tests of same year group of original scale.
	Year V:			
VI-1	Right and left	2	3	4
V-1	Comparison of weights	4	.....	.....
	Year VI:			
VI-3	Counting pennies	4	8	9
VI-4	Comprehension	12	.....	.....
	Year VII:			
VI-2	Missing parts	18	22	29
VIII-3	Comprehension	26	.....	.....
	Year VIII:			
IX-3	Making change	42	44	47
VIII-2	Counting 20–0	46	.....	.....
	Year IX:			
VIII-2	Ball and field (score 2)	60	88	84
X-5	Comprehension	117	.....	.....
	Year X:			
X-2	Absurdities	129	164	169
X-3	Designs	200	.....	.....
	Year XI:			
XII-3	Ball and field (score 3)	210	220	(1)
X-6	60 words 25 in 1 minute	230	.....	.....
	Year XII:			
XII-8	Similarities	249	256	262
XII-7	Picture interpretation	263	.....	.....

[1] Not represented.

The abbreviated scale is given and scored in the same way as the original except that six months credit is given for each test passed. The records of 294 subjects ranging up to 12.4 years mental age (on the original scale) were re-scored on the abbreviated scale. The deviations of new scores from the old were as follows:

Deviations[1]	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.2	2.3	3.2
Number	31	22	57	46	16	33	19	22	12	5	6	4	2	2	3	2	1	1	2	2	2	1	1

[1] Median deviation, 0.3 year; mean deviation, 0.46 year; mean deviation, 0.37 year, omitting cases 11.5 to 12.4.

The correlation of original and abbreviated scales is shown in Table 68. It will be seen that the mental ages agree very closely as far as mental age 10, but above this point the abbreviated scale yields mental ages which are considerably too low and apparently lacking in reliability. As far as the mental age of 9 years the agreement between original and short scales represents a correlation of approximately 0.95. As few rejections were recommended above the mental age of 9 years, the abbreviated scale could be used with a fair degree of safety in the large majority of cases. In order to measure as high as 12 years the abbreviated scale would have to have several tests above the 12-year level.

TABLE 68.—*Correlation of original and abbreviated Stanford-Binet scales. ($r=0.91$; for mental ages below 10.5 by short scale, $r=0.95$.)*

Mental age, 2 tests per year.	Mental age, 4 tests per year.																	
	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	Total.
12												1	1	2	7	5	1	17
11.5												1	3	4	6	3	4	21
11											1	3	2	2	3	6		17
10.5												3	5	9	8			25
10												4	15	14	7	1		41
9.5											3	6	17	9				35
9										2	11	21	9					43
8.5									3	8	16	4						31
8								3	6	9	3							21
7.5							2	9	6	1								18
7						1	5	1	1									8
6.5					1	3	1											5
6				1	2	1												4
5.5				2														2
5		1	1															2
4.5		1	2															3
4		1																1
Total		3	3	3	3	5	8	13	16	20	34	43	52	40	31	15	5	294

The 60-word test was the only one that would fulfill all the requirements at year 11, but in its original form it was too uneconomical of time. Comparison of the number of words named in 1 minute with the number named in 3 minutes gave for 422 subjects a correlation of 0.853. Twenty-five words in 1 minute is, in the case of white recruits, approximately equivalent to 60 words in 3 minutes, in the sense that about the same per cent of cases would pass (or fail) by either standard.

The abbreviated scale has the advantages that its tests are arranged more nearly in order of difficulty for soldiers than is the case with the tests of the original scale. This makes it possible to reduce considerably the range through which a subject is tested. Only 3 subjects who passed two consecutive tests below 8 years failed on a lower test, and only 7 subjects who failed on 4 successive tests above 8 years passed a higher test. As there were 115 subjects who failed on 4 consecutive tests above 8 years, the proportion of these who succeeded in passing a higher test was 1 in 16.

Another abbreviation[1] of the Stanford-Binet was worked out at Camp Lee by E. A. Lincoln and K. M. Cowdery. The data used consisted of the test records of 358 men, most of whom were beta failures. The mental ages ranged from 4 to 12 years. Thirteen tests were chosen and given a value of 6 months each, in addition to the basal allowance of 4 years. They were as follows:

[1] See School and Society, December 13, 1919, pp. 707–709.

V. Right to left: Weights (3–15 grams).
VI. Comprehension (VI); Aesthetic comparison.
VII. Comprehension (VIII); Missing parts.
VIII. Counting backward; Making change.
IX. Date; comprehension (X).
X. Absurdities; Arranging weights.
XI. Sixty words.

Considering only the mental ages as far as 11 years, the median deviation of short scale from complete scale was 0.3 year. "If a subject passes all the tests it is practically certain that his mental age is above 10.5 years."

A Camp Upton report on 100 men whose mental ages were computed both by the 4 tests per year scale and the above abbreviation showed a correlation of 0.955 (Pearson) between long and short scales. The short scale showed a median deviation of 3 months (.25 year) from the long scale.

SECTION 5.—*Abbreviation of the Yerkes-Bridges point scale.*

The data for the abbreviation of the point scale consisted of 479 records. Of these 186 came from Camp Greenleaf, about 200 from Camp Meade, and the remainder from Camps Travis and Stewart. The distribution of these cases according to total score was as follows:

Total score	0–9	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99
Number of cases	0	4	26	2	114	148	79	37	15	4

The diagnostic value of the separate tests was determined by plotting a correlation array for score in each test against score on the whole scale. These are shown in Table 73. The tests may be classified as follows:

EXCELLENT TO GOOD.

Test 15. Comprehension.
Test 7. Reaction to pictures.
Test 17. Absurdities.
Test 19. Abstract words.
Test 20. Analogies.
Test 18. Dissected sentences.
Test 13. Naming words.
Test 12. Square and diamond.
Test 10. Definitions, concrete terms.
Test 9. Comparison of objects.

GOOD TO FAIR.

Test 2. Missing parts.
Test 4. Memory for digits.
Test 14. Three words.
Test 16. Memory for designs.
Test 6. Memory for sentences.

POOR.

Test 1. Chooses prettier.
Test 3. Lines and weights.
Test 5. Counting 20–1.
Test 8. Arranging weights.
Test 11. Suggestibility.

The average score for each test was found and reduced to a percentage value of the maximum possible score on that test. The order of difficulty of the tests based upon this percentage value is given in Table 69. This order differs markedly from the order for children determined in the same way and represented by the present order of tests in the scale.

TABLE 69.—*Point scale tests in order of difficulty for white recruits.*

Tests.	Average score.	Ratio of average to possible score.	Tests.	Average score.	Ratio of average to possible score.
1. Aesthetic comparison and judgment	2.87	95.7	*4. Memory span for digits	2.88	57.7
3. Comparison of lines and weights	2.80	93.3	*15. Comprehension of questions	4.23	52.8
*2. Missing parts	3.57	89.2	6. Repetition of sentences	2.84	47.4
5. Counting backward	3.14	78.5	13. Free association	1.43	35.8
*9. Comparison of objects	4.40	73.3	*17. Criticism of absurd statements	1.72	34.4
8. Arranging weights	1.45	72.5	19. Definition of abstract terms	1.95	32.4
*12. Copying square and diamond	2.78	69.5	14. Three words in one sentence	1.29	32.3
7. Reaction to Binet pictures	6.02	66.9	*16. Drawing designs from memory	1.21	30.2
11. Resistance to suggestion	2.05	64.2	*20. Analogies	1.18	19.6
*10. Definitions of concrete terms	4.66	58.3	18. Construction of sentences	.87	14.4

The starred tests of the above list are the ones selected for the abbreviated scale. They are not in all cases the tests having highest diagnostic value, since it was necessary to consider time required to give a test, suitableness for illiterate subjects, and desirability of obtaining a short scale comparable in difficulty throughout its range with the entire scale. The average of the ratios in the last column of Table 69, for the starred tests, is practically the same as the average of the ratios for the entire scale, the former being 53.9 per cent and the latter 55.9 per cent. The average score for the entire scale is 53.3; for the abbreviated scale, 26.6. The average percentage of zero scores for the whole scale is 18.4; for the abbreviated scale, 12.9.

The total score on the abbreviated scale is 50 points. Records of 476 men were rescored on the abbreviated scale and the scores obtained multiplied by 2. The deviations of the short scale scores in points from the scores on the entire scale were as follows:

Deviations	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Number	31	75	73	69	49	35	37	36	22	21	9	4	5	2	4	4

The median deviation was 3 points, and the mean deviation 4.14 points. Since the yearly ncrements in points beginning with mental age 5 are 6, 7, 6, 9, 8, 6, 6, and 4, up to mental age 13, it will be seen that the median deviation of 3 points corresponds to approximately a half year in mental age from 5 to 8, about a third of a year from 8 to 10, a half year from 10 to 12, and three-quarters of a year at 13. The corrresponding median deviation of the short form of the Stanford-Binet was three-tenths of a year.

The correlation of abbreviated with complete Point Scale for the 475 subjects, ranging in mental age from 4 to 18 years, was 0.934 (Pearson). When subjects above 12.5 mental age were excluded, in order to make the coefficient of correlation comparable with that for the abbreviated Stanford-Binet (which extends only to 12.5 years), the correlation was reduced from 0.934 to 0.913. (Corresponding figure for Stanford-Binet, 0.912.)

TABLE 70.—*Correlation of brief with complete point scale.* (*r.=.934.*)

Complete point scale.	Brief point scale.													
	0-3	4	8	12	16	20	24	28	32	36	40	44	48	Total.
96–													1	1
88–95											1	4		5
80–87										2	5	1		8
72–79								1	11	13	7			32
64–71							1	12	28	11	1			53
56–63						1	17	65	16	2				101
48–55					1	16	60	30	2					109
40–47					14	42	25	3						84
32–39				8	19	13	2							42
24–31			2	15	13	1								31
16–23		1	5											6
8–15	1	1	1											3
0– 7														
Total...	1	2	8	23	47	73	105	111	57	28	14	5	1	475

Certain important facts in the above correlation arrays are summarized in tables 71 and 72.

TABLE 71.—*Median scores (computed) on whole scale for subject making each score on each test.*

Score.	Test.																			
	1	[1] 2	3	[1] 4	5	6	7	8	[1] 9	[1] 10	11	12	13	14	[1] 15	[1] 16	[1] 17	18	19	[1] 20
0	28	22	28	33	38	34	24	34	20	39	41	27	42	42	36	46	42	49	43	43
1	44	31	35	34	39	34	24	47	36	29	48	39	49		39	56	47		53	54
2	34	38	47	46	45	49	44	55	41	39	53	50	56	60	41	55	54	63	52	56
3	53	48	53	54	49	50	38		47	43	55	53	60	69	48	60	57		59	62
4		54		57	56	56	44		51	50		57	69	71	51	69	64	74	60	74
5				68		74	49		54	53					56		75		89	89
6						66	52		59	58					59			74	75	80
7							59			71					71					
8							66			75					72					
9							65													

[1] Tests selected for short scale.

TABLE 72.—*Number of subjects making each score in each test.*

Score	Test.																			
	1	[1] 2	3	[1] 4	5	6	7	8	[1] 9	[1] 10	11	[1] 12	13	14	[1] 15	[1] 16	[1] 17	18	19	[1] 20
0	12	5	6	2	17	1	3	94	4	4	80	9	118	144	27	186	145	198	173	148
1	3	15	26	32	19	29	1	71	15	6	61	64	160	.....	9	90	87	.....	12	159
2	18	34	26	142	21	257	8	306	48	13	88	107	99	37	85	99	84	38	147	89
3	436	74	420	190	33	4	43	.....	76	34	245	136	64	3	45	44	73	.....	10	37
4	.....	349	.....	70	335	152	42	.....	70	159	.....	158	32	57	99	31	50	20	91	13
5	.....	.....	.....	43	.....	2	50	.....	105	130	.....	.....	.....	.....	38	.....	25	.....	4	4
6	.....	.....	.....	.....	.....	29	185	.....	159	63	.....	.....	.....	.....	87	.....	.....	13	32	2
7	.....	.....	.....	.....	.....	.....	58	.....	.....	16	.....	.....	.....	.....	12	.....	.....	.....	.....	.....
8	.....	.....	.....	.....	.....	.....	46	.....	.....	31	.....	.....	.....	.....	51	.....	.....	.....	.....	.....
9	.....	.....	.....	.....	.....	.....	40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

[1] Tests selected for short scale.

In several camps the point scale was abbreviated by using the odd numbered tests and multiplying the score thus covered by 1.7. For 168 cases at Camp Sherman, mostly beta failures, the correlation between the complete scale and the odd-numbered tests was 0.88. For 167 cases at Camp Greenleaf the correlation was 0.96. The median deviation of score on the odd numbered from score in the complete scale was stated as approximately six months in the case of 168 Camp Sherman records. It was found at Greenleaf that total score on tests 4, 9, 10, 12, 15, 16, 17, and 20 correlated 0.97 with score on the complete scale. The regression equation for this combination of tests was found to be as follows: Total score equals partial score multiplied by 2, plus 6. The probable error of estimate by this formula was stated as approximately 2 points. In the same study, tests 4, 9, 16, and 17 gave a score which correlated 0.86 with score on the complete scale. The regression equation was: Total score equals 3.5 times partial score, plus 15. This gave a probable error of estimate of approximately 4 points, which corresponds on an average to about eight months in terms of mental age. A short point scale arranged at Camp Sherman consisted of tests 2, 4, 9, 15, and 17, total score of which correlated 0.89 with total score of complete scale. These five tests yield a total score which approximates one-third of score by entire scale, but with a probable error of estimate of somewhat more than a half year. It is evident that the scale thus reduced must be used with caution.

TABLE 73.—*Correlations of separate tests of point scale with total score of point scale.*

Total score.	Test 1.				Test 2.					Test 3.				Test 4.					
	0	1	2	3	0	1	2	3	4	0	1	2	3	0	1	2	3	4	5
90	.....	.....	.....	4	.....	.....	.....	.....	4	.....	.....	.....	4	.....	.....	.....	.....	1	3
80	.....	.....	.....	15	.....	.....	.....	.....	15	.....	.....	.....	15	.....	.....	1	5	1	7
70	.....	.....	.....	37	.....	.....	.....	1	36	.....	.....	1	36	.....	.....	4	12	11	10
60	1	.....	.....	79	.....	.....	3	12	64	.....	1	3	75	.....	.....	12	43	17	7
50	.....	.....	1	133	.....	.....	6	22	114	.....	7	7	130	.....	3	43	64	28	10
40	1	2	5	109	.....	3	7	21	86	.....	3	7	107	.....	7	42	52	8	5
30	3	.....	5	44	.....	5	7	15	25	2	4	6	40	2	9	25	13	2	1
20	6	1	6	13	3	5	11	3	5	4	8	1	13	.....	8	15	1	2	.....
10	1	.....	1	2	2	2	.....	.....	.....	.....	3	1	.....	.....	4	.....	.....	.....	.....
Total.	12	3	18	436	5	15	34	74	349	6	26	26	420	2	32	142	190	70	43

Total score.	Test 5.					Test 6.							Test 7.									
	0	1	2	3	4	0	1	2	3	4	5	6	0	1	2	3	4	5	6	7	8	9
90	.....	.....	.....	.....	4	.....	.....	.....	.....	1	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	1	3
80	.....	.....	.....	.....	15	.....	.....	2	.....	10	1	2	.....	.....	.....	.....	.....	.....	2	4	7	2
70	.....	.....	.....	.....	37	.....	.....	12	.....	19	.....	6	.....	.....	.....	1	.....	2	8	6	10	10
60	1	.....	.....	1	78	.....	.....	38	.....	29	1	11	.....	.....	.....	4	2	2	28	19	14	11
50	7	2	6	14	115	.....	4	76	2	54	.....	5	.....	.....	2	3	10	21	73	18	10	6
40	24	7	9	10	67	.....	8	68	2	36	.....	2	1	.....	3	12	16	13	48	10	4	8
30	23	5	2	6	16	1	4	41	.....	2	.....	.....	.....	.....	.....	13	7	9	22	1	.....	.....
20	12	4	4	2	3	.....	10	19	.....	1	.....	.....	1	1	2	9	6	3	4	.....	.....	.....
10	3	1	.....	.....	.....	.....	3	1	.....	.....	.....	.....	1	.....	1	1	1	.....	.....	.....	.....	.....
Total...	70	19	21	33	335	1	29	257	4	152	2	29	3	1	8	43	42	50	185	58	46	40

TABLE 73.—*Correlations of separate tests of point scale with total score of point scale*—Continued.

Total score.	Test 8.			Test 9.							Test 10.								
	0	1	2	0	1	2	3	4	5	6	0	1	2	3	4	5	6	7	8
90	.....	.....	4	.....	.....	.....	.....	.....	2	2	.....	.....	.....	.....	.....	.....	.....	.....	4
80	1	2	12	.....	.....	.....	.....	.....	2	13	.....	.....	.....	.....	.....	1	6	.....	8
70	4	10	31	.....	.....	.....	2	3	12	21	.....	.....	.....	.....	7	9	6	9	7
60	.....	2	66	.....	.....	1	4	13	18	43	.....	.....	.....	7	21	28	15	5	5
50	19	17	106	.....	1	7	26	23	35	51	.....	.....	.....	8	57	43	26	2	5
40	22	23	72	.....	4	17	29	16	26	25	2	2	6	18	48	32	6	.....	1
30	27	12	13	.....	7	10	12	12	6	5	1	1	5	14	15	12	3	.....	1
20	18	4	2	2	2	12	3	3	4	.....	.....	2	2	7	10	4	1	.....	.....
10	3	1	.....	2	1	1	.....	.....	.....	.....	1	1	.....	.....	1	1	.....	.....	.....
Total.	94	71	306	4	15	48	76	70	105	160	4	6	13	54	159	130	63	16	31

Total score.	Test 11.			Test 12.					Test 13.					Test 14.				
	0	1	2	3	0	1	2	3	4	0	1	2	3	4	0	1	2	3	4
90	.....	.....	.....	4	.....	.....	.....	1	3	.....	.....	.....	1	3	.....	.....	1	.....	3
80	3	1	1	10	.....	.....	.....	5	10	1	.....	2	7	5	.....	.....	2	.....	8
70	2	2	6	26	.....	1	8	10	18	.....	6	11	13	7	3	.....	3	1	20
60	4	10	18	47	.....	2	15	23	36	5	27	21	12	10	7	.....	11	2	14
50	11	15	29	89	.....	10	33	46	54	26	46	43	24	7	22	.....	13	.....	9
40	23	22	24	47	2	19	30	33	33	36	58	18	5	.....	60	.....	4	.....	2
30	16	7	10	18	2	19	14	14	3	31	16	4	2	.....	34	.....	.....	.....	1
20	18	1	.....	3	4	10	7	4	1	16	7	.....	.....	.....	17	.....	.....	.....	.....
10	3	.....	.....	1	1	3	.....	.....	.....	3	.....	.....	.....	.....	1	.....	.....	.....	.....
Total.	80	61	88	245	9	64	107	136	158	118	160	99	64	32	144	.....	37	3	57

Total score.	Test 15.									Test 16.					Test 17.					
	0	1	2	3	4	5	6	7	8	0	1	2	3	4	0	1	2	3	4	5
90	.....	.....	.....	.....	.....	.....	.....	1	3	.....	1	1	.....	2	.....	.....	3	.....	2	2
80	.....	.....	.....	.....	1	.....	2	2	10	4	.....	4	1	5	.....	6	18	3	3	8
70	.....	.....	.....	1	3	3	10	3	17	7	4	8	8	8	1	6	38	10	12	5
60	.....	.....	1	3	19	12	31	3	11	12	19	24	14	4	9	24	20	16	14	5
50	2	.....	16	16	33	12	34	3	9	56	22	32	15	9	30	40	5	33	16	3
40	9	4	31	18	31	11	8	.....	.....	47	33	26	6	3	43	9	.....	9	3	2
30	6	3	26	5	8	.....	2	.....	1	37	7	4	.....	.....	36	2	.....	2	.....	.....
20	7	2	11	2	4	.....	.....	.....	.....	21	4	.....	.....	.....	23	.....	.....	.....	.....	.....
10	3	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	3	.....	.....	.....	.....	.....
Total.	27	9	85	45	99	38	87	12	51	186	90	99	44	31	145	87	84	73	50	25

Total score.	Test 18.							Test 19.							Test 20.						
	0	1	2	3	4	5	6	0	1	2	3	4	5	6	0	1	2	3	4	5	6
90	.....	.....	.....	.....	1	.....	3	.....	.....	.....	.....	.....	2	2	.....	.....	.....	1	.....	2	1
80	1	.....	3	.....	5	.....	1	.....	.....	.....	1	3	1	9	.....	7	1	2	3	1	.....
70	6	.....	9	.....	7	.....	4	.....	.....	7	2	17	1	10	.....	10	11	7	6	1	.....
60	21	.....	11	.....	6	.....	4	11	3	26	2	28	.....	8	8	31	22	12	2	.....	1
50	69	.....	10	.....	1	.....	1	38	4	60	3	34	.....	3	32	61	32	10	1	.....	.....
40	52	.....	5	.....	.....	.....	.....	61	2	42	2	9	.....	.....	56	32	17	4	1	.....	.....
30	31	.....	.....	.....	.....	.....	.....	42	1	9	.....	.....	.....	.....	33	14	4	1	.....	.....	.....
20	16	.....	.....	.....	.....	.....	.....	19	1	3	.....	.....	.....	.....	16	4	2	.....	.....	.....	.....
10	2	.....	.....	.....	.....	.....	.....	2	1	.....	.....	.....	.....	.....	3	.....	.....	.....	.....	.....	.....
Total...	198	.....	38	.....	20	.....	13	173	12	147	10	91	4	32	148	159	89	37	13	4	2

CHAPTER 9.

EFFECT OF DOUBLING THE TIME LIMITS IN THE ALPHA AND BETA EXAMINATIONS.

The alpha and beta examinations are frequently characterized as "speed" tests because of the fact that they are done against time and, further, because of the belief that with unlimited time all tests could be done nearly perfectly. It is not possible, however, to state, a priori, just what part time does play in the examinations, or whether there are individuals at certain levels of intelligence who could improve their performance but little with a considerable extension of the period. In order to investigate this point, to determine more fully what these time relations are within any particular test, and to find out what an extension of the period would do in the case of persons at different levels of intelligence, arrangements were made for an experiment in which the alpha examination was given with double time, and performance under double time was compared with performance in single time.

It should be noted in this connection that it is often argued that the alpha examinations, because of the limited period, are especially unfair to persons who may be described as a slow, cautious, intelligent type. It is argued, often in military contexts, that there are individuals who are entirely adequate to the kind of performance required in the tests, but who, since they combine slowness with accuracy, require a longer period of time in order to do themselves justice. An experiment in doubling the time on alpha will show to what extent performance is improved by extending the time limits. It can not, however, be expected that the order of abilities of various persons will be very materially altered. A change of order would occur only if the tests were of the type in which time was relatively unimportant—so-called "power" tests. Here it might happen that quick individuals, scoring high, would reach the limit of their abilities and fail to profit by additional time, whereas slow, capable persons would plod unerringly on in the extended period and outdistance in the end their more speedy rivals.

The experiment consisted in giving alpha with double time to 510 men at Camps Beauregard and MacArthur. At Camp Beauregard 10 companies (387 men) were examined; at Camp MacArthur, three companies (123 men). At Camp Beauregard no men had been segregated from the group for the beta examination, but the high range of scores indicates that but few should properly have been sent to beta. At Camp MacArthur 60 men had been withdrawn from the group for beta; the remaining 123 took alpha. The distribution of scores of the two groups thus selected show that they are comparable. The method of giving alpha was as follows: At the end of the usual time (e. g., 5 minutes on test 2, 1½ minutes on test 3) the examiner called "stop" and instructed the men to draw a line across the page at the point reached. This line marked the work done in "single time." The men were then instructed not to change anything above this line but to work on down the page. Time was called when a double period had been completed.

In all companies but one, company commanders were requested to assign ratings of intelligence for all men taking the examination. Independent ratings were made by three company officers. In all, 475 of the 510 men were thus rated. The men had been known to their officers for periods ranging from two to twelve weeks. That the officers did their rating by approximately the same standards is indicated by the following correlations for 99 men taken from the MacArthur data:

Ratings of captain with first lieutenant correlate 0.79.
Ratings of captain with second lieutenant correlate 0.77.
Ratings of first and second lieutenants correlate 0.74.

The following correlations sum up the results so far as they can be indicated in the total scores for single time and for double time:

Correlation of single-time total score with officers' rating, 0.490.
Correlation of double-time total score with officers' rating, 0.530.
Correlation of single-time total score with double-time total score, 0.965.
Correlation ratio of single-time total score with double-time total score, 0.980.

It will be seen from the above that doubling the time does not greatly alter the character of alpha. The coefficient of correlation between single time and double time is 0.965 and is based on approximately linear data, since the correlation ratio is but slightly greater. The close agreement between the two coefficients of correlation of officers' ratings with time substantiates this conclusion. The slight difference of 4 per cent is scarcely significant (especially since the data are for the same group), and can not be taken to mean that double time would give a better measure of the quantity which officers rate as intelligence.

In general, then, we have no reason to assume that an extension of time limits would have improved the test or have given an opportunity to many individuals materially to alter their ratings. We can, of course, gain considerable information concerning the characteristics of alpha by a further study of the data.

Table 74 shows the amount of gain made by persons of different levels of intelligence (as indicated by score, "single time") and the percentage of gain. The column for percentage indicates that, in general, individuals scoring low gain more than individuals scoring high—a fact that is undoubtedly due in part to the limited possibility for gain at the upper end of the scale. A subject can not do more than all the items. The column for totals in Table 75 gives these facts in summary. The increase in score was, on the average, from 62 to 80.5—a mean gain of 18.5.

TABLE 74.—*The mean gain, the percentage of gain, and the frequency for men making various scores, single time.*

Alpha score, single time.	Mean gain.	Percentage of gain.	Number of cases.	Alpha score, single time.	Mean gain.	Percentage of gain.	Number of cases.
180–189	9	5	2	80–89	26	31	38
170–179	14	8	1	70–79	23	31	37
160–169	15	9	3	60–69	21	32	39
150–159	26	17	1	50–59	18	33	57
140–149	26	18	5	40–49	16	35	70
130–139	27	20	15	30–39	12	34	66
120–129	25	20	5	20–29	8	32	59
110–119	28	24	20	10–19	6	40	21
100–109	30	29	24	0– 9	2	40	13
90– 99	25	26	34				

The agreement of the distributions for single time and double time on any one test is a measure of the effect of double time on that test and is indicated roughly by the means and standard deviations in Table 75. It appears that test 2 is affected least and test 3 most by the extension of time. An arrangement in order from the least to the most affected gives 2, 4, 6, 7, 8, 5, 3. But in the order of the mean gain arranged from least to most, we have 2, 6, 4, 5, 3, 7, 8. These means, however, are not exactly comparable because there is more chance for gain in tests 4, 7, and 8, since there are 40 items in each. Moreover, the items are not equal in different tests; a gain of one item in one test is not the same as a gain of one item in another test. The order derived directly from the distributions is, therefore, more nearly the truth.

TABLE 75.—*Means and standard deviations of double time, single time, and gain on each alpha test.*

Test	2	3	4	5	6	7	8	Total.
Mean double time	9.16	9.85	12.60	10.62	8.15	12.46	16.80	80.5
Mean single time	8.00	6.32	10.50	7.48	6.96	8.60	12.60	62.0
Standard deviation double time	3.79	4.40	9.74	7.17	4.60	10.64	8.94	42.2
Standard deviation single time	3.10	3.30	8.36	5.54	3.73	7.98	7.96	35.0
Mean gain	1.16	3.53	2.08	3.14	1.19	3.80	4.20	18.5

Table 76 shows for every one of the tests the coefficients of correlation between scores obtained under different times and officers' ratings. It will be noted that the correlations between double and single time for all tests except 3 are above 0.90. This means, again, that double time has no great general effect. Arranging the tests in order of the size of these coefficients we have from greatest to least 6, 4, 2, 7, 8, 5, 3—the same general order as above. Tests 2, 4, and 6 occupy the three first positions—that is, they are affected least.

TABLE 76.—*Correlations between the separate tests, double and single time, with a variety of different measures.*

Correlation between—	Tests.						
	2	3	4	5	6	7	8
1. Double and single time	0.937	0.879	0.940	0.902	0.960	0.920	0.910
2. Officers' ratings and double time	.384	.432	.422	.405	.350	.409	.490
3. Officers' rating and single time	.320	.450	.433	.382	.308	.352	.473
4. Officers' rating and gain [1]	.331	.188	.206	.232	.313	.329	.120
5. Total score (single time) and gain [1]	.540	.271	.347	.270	.316	.395	.155
6. Total score (single time) and single time	.732	.784	.868	.805	.753	.824	.848
7. Total score (single time) and double time	.800	.736	.867	.745	.711	.786	.821
8. Single time and total score of remaining six tests (single time)	.706	.743	.785	.740	.701	.721	.761
9. Double time and total score on remaining six tests (single time)	.784	.704	.802	.690	.662	.700	.754

[1] Correlations only approximately representative, since distributions are greatly skewed.

TABLE 77.—*Correlation for alpha total score single time with alpha total score double time.* ($r=0.967$.)

Single time.	Double time.																					
	0–9	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100–109	110–119	120–129	130–139	140–149	150–159	160–169	170–179	180–189	190–199	Total.
180–189																				2	2
170–179																			1		1
160–169																		1	2		3
150–159																		1			1
140–149																1	2	1	1		5
130–139															2	3	8	1	1		15
120–129														1	1	2	1				5
110–119												1	3	6	3	3	4				20
100–109											2	2	3	7	6	4					24
90– 99											5	13	12	2	2						34
80– 89									1	3	11	15	6	1	1						38
70– 79								1	5	13	12	5	1								37
60– 69							1	7	20	9	1	1									39
50– 59						7	17	17	14	1	1										57
40– 49					5	32	23	10													70
30– 39				14	26	22	4														66
20– 29			12	35	12																59
10– 19		3	16	2																	21
0– 9	7	6																			13
Total																					510

We have seen that doubling the time does not result in any demonstrable improvement in alpha as a whole. We have further to ask, however, whether some single test may not be appreciably benefited by an increase of period. If we take officers' ratings as a measure of excellence in the test, then the change in correlation with officers' ratings from single to double time will show whether the test is improved, or the converse. In other words, we may tabulate the differences between the second and third rows of table 76. These differences are:

Tests	2	3	4	5	6	7	8
2 minus 3	+0.064	−0.018	−0.011	+0.023	+0.042	+0.058	+0.017

It will be noted that in tests 3 and 4 the difference is negative, which means that the correlations of these tests, single time, with ratings are greater than their correlations, double time, with ratings. The differences in tests 2, 7, and 6 are probably significant, but not enough to justify recommending double time.

If we take the agreement of one test with all the others as our standard of excellence, then we are interested in the changes of correlation from row 6 to row 7, for, subtracting row 6 from row 7, we get the differences between the coefficients of each test, single time, with total score, single time, and each test, double time, with the same. These differences are:

Tests.....	2	3	4	5	6	7	8
7 minus 6.....	+0.068	−0.048	−0.001	−0.060	−0.042	−0.038	−0.027

Arranging the tests in the order of these differences from the greatest to the least we have 2, 4, 8, 7, 6, 3, 5.

It may be argued, however, that these correlations are not quite fair to double time, since we are actually correlating the single time scores with a total of which they are a part. To meet this objection each test, single time, was correlated with the total scores of the remaining seven tests. Then double time on each test was correlated with the same total. The results, as expressed in differences obtained by subtracting row 8 from row 9 in table 76, are:

Tests.....	2	3	4	5	6	7	8
9 minus 8.....	+0.078	−0.039	+0.017	−0.050	−0.039	−0.021	−0.007

Arranging the tests in the order of the differences from greatest to least we have 2, 4, 8, 7, 6, 3, 5. This is exactly the same order as above except for the tie between tests 6 and 3, but the differences are more in favor of double time. On the basis of the above correlations double time could not be recommended on any test except test 2.

TABLE 78.—*Per cent who gained at each level of the various tests.*

Score single time.	2	3	4	5	6	7	8
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
0.....	0	29	9	27	5	26	20
1.....	33	46		67	18		
2.....	25	77	32	68	12	65	75
3.....	23	90		86	17		
4.....	47	90	56	63	36	75	77
5.....	33	93		78	40		
6.....	49	96	42	86	49	81	82
7.....	42	96		75	62		
8.....	46	97	60	85	69	79	85
9.....	62	97		86	86		
10.....	66	85	54	87	87	90	93
11.....	72	94		94	90		
12.....	89	77	67	90	100	93	95
13.....	92	100		100	75		
14.....	90	50	80	100	92	93	100
15.....	100	50		90	100		
16.....	67		67	88	100	82	97
17.....	100			100	100		
18.....	100		84	100	100	90	79
19.....	100			90			
20.....			80	100		100	70
21.....				100			
22.....			79	00		75	63
23.....				50			
24.....			75			100	62
25.....							
26.....			70			90	73
27.....							
28.....			86			100	45
29.....							
30.....			100			100	30
31.....							
32.....			100			85	
33.....							
34.....			100			50	
35.....							
36.....			50			00	
37.....							
38.....							

Table 78 shows the per cent of the individuals making any particular score (single time) who gain in the second half of the double period. If all tests were "speed" tests, then these percentages should all be high—i. e., all individuals at all levels should gain with additional time. If any test were entirely a "power" test, then the percentages should be uniformly low; the individuals should have reached their limit within the initial period and be unable to better themselves. Inspection of the table shows that, in general, the percentages tend to increase as the level of intelligence increases. This condition can certainly be said to obtain for tests 2, 4, 5, 6, and possibly 7. We might say, therefore, in the case of these tests that they are neither principally "speed" tests nor "power" tests, but tend to show the characteristics of a "power" test more at the low levels than they do at the high levels. The high frequencies of persons gaining at the upper levels (often 100 per cent) indicate that for the people making high scores on single time the "speed" element is predominant. In the middle and lower ranges the "power" element is more important. Many persons do not gain in the additional time. It can hardly be said, however, that at these levels the "power" factor is ever so important as is "speed." Very small percentages do not occur with the frequency of high percentages. The falling off of percentages of test 5 and 7 at the upper end must not be taken to mean that the "power" factor, in any legitimate sense of the term, comes in at this point. Men of maximum intelligence are unable to increase their performance here because they complete the test in considerably less than double time.

Tests 3 and 8 differ from the other tests in not showing any dependence of the relative importance of "speed" and "power" upon the level of intelligence. The series of percentages seem to show no particular change (except at the very lower end of test 3 where there seems to be some limitation of "power" and at the very upper end where double time ceases to be useful).

It would be possible to give in all the cases of table 78 the median amount gained. These values are, however, meaningless because the various items from one test to another, and even within the same test, do not represent equal differences of difficulty. It is of interest to discover, however, to what extent individuals are prevented from doing themselves justice by virtue of the fact that the times are too long; that is to say, to what extent the quick, alert individual is handicapped in alpha. Table 79 shows the percentage of those attempting all items and at least all but two items on each of the tests. The third column of the table shows that only negligible percentages finish the test in single time, whereas a considerable number finish in double time. In all tests but test 2 more than 16 per cent are through in double time and are, therefore, scored too low. The rule upon which the time limits of alpha were originally based was that not more than 5 per cent of an unselected group should complete all items on any test. Double time, it will be seen, violates this rule in all tests. In view of these results it is improbable that anyone would argue for an increase to double time, much less for an increase greater than double time. The last column of table 79 indicates that even very much greater percentages would accrue to the various tests were the time extended beyond double time.

TABLE 79.—*Percentages attempting all items, and at least all but two items in double and single time.*

Test.	Time.	Number attempting all items.	Number attempting at least all but two items.
2	Double	6.3	14.9
	Single	.4	2.2
3	Double	28.2	41.9
	Single	.9	2.7
4	Double	16.0	24.1
	Single	.6	1.6
5	Double	35.0	16.2
	Single	2.9	4.1
6	Double	18.6	28.0
	Single	1.4	3.6
7	Double	17.6	23.0
	Single	.8	1.6
8	Double	18.6	31.1
	Single	2.3	6.1

Assuming that we are dealing with an unselected group, table 79 shows that some limit between double and single time would probably be more suitable. Arranging the tests here in the order of "per cent attempting all items in double time" and arranging from lowest to highest per cents we have 2, 4, 7, 6, 8, 3, 5.

We can get before us a picture of the relative effects of double time on the separate tests by collecting the various rankings of tests made in the preceding paragraphs.

1. Tests in order of agreement of distributions for double time and single time, 2, 4, 6, 7, 8, 5, 3.

2. Tests in order of degree of correlation between scores in single time and double time, 6, 4, 2, 7, 8, 5, 3.

3. Tests in order of improvement of double time over single time as measured by officers' ratings, 3, 4, 8, 5, 6, 7, 2.

4. Tests in order of improvement of double time over single time as measured by correlation with total score (single time), 5, 3, 6, 7, 8, 4, 2.

5. Tests in order of improvement of double time over single time as measured by correlation with total score of remaining six tests, 5, 3, 6, 7, 8, 4, 2.

6. Tests in order of the degree in which they can afford increase of time without an injustice to quick men, 5, 3, 8, 6, 7, 4, 2.

Similar results were obtained in a second experiment with double time on alpha. The data for this experiment are not given in detail because they add little that is new to the foregoing conclusions. The conditions were somewhat different: The men were allowed to finish the alpha examination in the usual manner; then, when the last test was completed, they were instructed to go back to test 2, to draw a line across the page at the point which they had reached when time was called and to begin there and work on down the page. After they had continued with test 2 an additional period equal to the first, the same procedure was followed successively with the remaining tests. Instructions were given not to make any corrections or changes in the part of the test done during the first period. There were 155 men given alpha at Camp MacArthur under these conditions.

The correlation between total score, single time, and total score, double time, in this experiment, is 0.967, as against 0.965 in the preceding experiment. The correlation of total score, double time, with officers' ratings, is 0.559; of total score, single time, with officers' ratings, 0.526—a difference of 0.033 as against 0.04 in the preceding experiment.

The correlations between double time and single time for the various tests are as follows:

Tests	2	3	4	5	6	7	8
Correlations	0.959	0.832	0.960	0.937	0.940	0.932	0.916

The various tests may be ranked as follows:

1. Tests in order of agreement of distributions for double time and single time, 2, 4, 6, 5, 7, 8, 3.

2. Tests in order of degree of correlation between scores in single time and double time, 4, 2, 6, 5, 7, 8, 3.

In addition to the foregoing data there are results for giving beta with double time to 60 men at Camp MacArthur. The number of cases is too small to justify detailed treatment.

The correlation between officers ratings and beta total score, single time, is 0.460; with beta, double time, 0.370. The correlation between beta total score, double time, and total score, single time, is 0.950. This seems to indicate that the scale as a whole is affected very little by doubling the time and that the effect is injurious rather than helpful.

Considering the tests separately we get the following correlations:

Correlations between—	1	2	3	4	5	6	7
Double time total score and officers' ratings	0.135	0.30	0.198	0.390	0.286	0.389	0.321
Single time total score and officers' ratings	.156	.278	.257	.486	.190	.297	.318

CHAPTER 10.

THE ASSIGNMENT OF LETTER RATINGS.

SECTION 1.—*Examinations a and alpha.*

The question of the nature of ratings to be assigned was not considered at length in the Vineland sessions of the committee on examination of recruits, although various suggestions were made. Among these were: (1) Classification into deciles; (2) classification into five groups—very superior, superior, average, inferior, and very inferior. After the unofficial trial in July and August, 1917, it was decided to use both methods of classification, and space was accordingly provided on the individual record card for recording the decile rank to which a man belonged, and in addition a letter grade, A, B, C, D, or E. On the recommendation of Thorndike it was decided to assign letter grades on examination *a* as follows:

E	D	C	B	A
0–49	50–99	100–249	250–299	300–414

The percentile classification was never employed to any extent, chiefly because of the lack of satisfactory norms.

The above fivefold classification remained in use until March 1, 1918, and gave the following distribution of grades for the 56,140 literate white men who were given examination *a* in the first four camps:

Letter rating ...	E	D	C	B	A
Per cent.....	7	15.5	60.9	10.6	5.9

When the use of alpha was begun in March, 1918, the following sevenfold classification was substituted for the previous fivefold classification:

E	D	C–	C	C+	B	A
0–49	50–99	100–129	130–189	190–229	230–279	280–412

This basis of rating gave an unsatisfactory distribution of grades, as is shown by the following percentage distribution for 128,747 literate white men of several draft quotas.

Letter rating ..	E	D	C–	C	C+	B	A
Per cent.....	16.57	27.05	14.72	21.55	9.18	6.84	4.09

In June, 1918, the following rating system, based on raw scores, was tentatively adopted:

E	D	C–	C	C+	B	A
0–14	15–29	30–49	50–79	80–109	110–139	140–212

This gave a much more satisfactory distribution of grades, as will be seen from the following percentage distribution for the 128,747 literate men mentioned in the preceding paragraph.

Letter rating ..	E	D	C–	C	C+	B	A
Per cent.....	7.38	14.38	21.86	26.78	16.69	8.82	4.09

On August 1, 1918, the rating system was revised for both the group examinations and for all three of the individual examinations. At this time grade E was redefined and grade D− was inserted below D. E henceforth was used to designate those who were considered mentally unsuitable for recommendation for regular service and who were therefore recommended for special service organizations, development battalions, or discharge. Since fitness for regular service was not considered to depend upon intelligence alone, the grade E was therefore no longer strictly an intelligence rating. As employed it was applied to many who, on the basis of intelligence alone, would have graded *D*− or even D. The assignment of E on the basis of a group examination was strictly forbidden. This rating basis, which remained in use until the close of the war, gave the following distribution of grades for the same group:

Letter rating..	D−	D	C−	C	C+	B	A
Per cent.....	0–14 7.38	15–24 9.19	25–44 21.50	45–74 28.66	75–104 18.30	105–134 9.83	135–212 5.14

SECTION 2.—*Examination for illiterates.*

In the first four camps letter ratings were not assigned on the examination for illiterates (Stenquist skill test). Space was provided on the individual record card for the percentile ranking, but this was not commonly given. The following system of letter rating and percentile ranking was worked out at Camp Dix from the Stenquist tests of 909 unselected men of the Three hundred and third Engineers:

Score.....	0	10	20	30	40	50	60	70	80	90	98
Percentile rank.....	0	1.5	6	12	22	37	53	69	83	94	100

Range of score.		Rating.
Complete stenquist.	Half stenquist.	
96–100	48–50	A
80– 95	40–47	B
40– 79	20–39	C
20– 39	10–19	D
0– 19	0– 9	E

When the beta examination was devised a rough attempt was made to equate its ratings with those of examination *a*, particularly in the middle and upper ranges. The rating basis for beta is set forth in chapter 6, and the modification adopted in August, 1918, together with the reasons therefor are set forth in chapter 7. This final rating basis for beta proved to be satisfactory.

SECTION 3.—*Individual examinations.*

No instructions were given for the assignment of ratings on the original individual examination series. Space was provided on the individual record card for recording the percentile rank but, owing to the lack of norms, this was not extensively done. When the tests of this series were used at all, the letter rating was assigned on the basis of the personal judgment of the examiner as to the merit of the subject's performance; usually, however, other individual examination methods were substituted for the series originally provided, and when this was done a mental age was assigned in lieu of a letter rating.

On March 1, 1918, the assignment of letter ratings on performance scale scores was authorized as follows:

E	D	C, B, or A
0–99	100–169	170 or above

On July 2, 1918, letter ratings on the basis of mental age (for all the individual examination methods) were authorized on the following basis:

E	D	C−	C	C+	B	A
Below 9.....	9-10.9	11-12.4	12.5-14.4	14.5-15.9	16-17.9	18 or above.

This was changed as a result of Alpha-Beta-Stanford investigation (see chapter 7) to the following, which was retained until the close of the war:

E	D−	D	C−	C	C+	B	A
Not fixed.... ..	0-9.4	9.5-10.9	11-12.9	13-14.9	15-16.4	16.5-17.9	18-up.

The final grade basis for all the scales used in psychological examining is set forth in the revised Examiner's Guide (p. 195, Part I).

The figures below show the percentage distribution of letter ratings assigned to the men of several draft quotas on the basis of all the examinations used. It represents, perhaps not unfairly, the outcome of the rating method finally adopted. It should be stated that in case a man was given two or more examinations the letter grade assigned was the highest one earned.

Distribution of letter ratings for 167,035 white drafted men was as follows:

Letter rating ...	D− or E.	D.	C−.	C.	C+.	B.	A.
Per cent.....	1.68	20.66	25.40	25.39	14.93	7.90	4.04

It will be understood that the assignment of letter ratings was a practical rather than a scientific problem. The range of the A rating was made wide because of the general belief that above a certain level of intelligence the military value of an individual depended chiefly upon other factors. The distinction between A and B ratings was not greatly stressed. The lines were so drawn as to skew the distribution of final ratings considerably toward the low end. This was thought to be in the interest of safety, since 20 per cent or more of an average draft quota were either foreign or illiterate, and therefore usually unsuitable for positions of special responsibility.

From the administrative point of view it was perhaps unfortunate that a satisfactory method of rating was not provided earlier in the work, since a certain amount of confusion was caused by the frequent changes in the basis of rating. It would also have been well had more attention been paid to the equating of ratings on the different examinations. The method finally adopted was in the main satisfactory in this respect, but earlier in the work a letter rating of D or C− made on the beta examination was certainly far from being equivalent to D or C− ratings on the alpha examination. Naturally, the individual who took two or more examinations was favored, since he always stood a chance to gain and never to lose.

Section 4.—*Explanation of letter ratings to commanding officers.*

In the work of the first four camps the only explanation of grades furnished to commanding officers were the definitions of the letter ratings as meaning very superior, superior, average, etc. In the spring and summer of 1918 the chief psychological examiners in a majority of the camps found it helpful to issue a somewhat more elaborate statement for the interpretation of the ratings. These were made up in many different forms, some very brief, others as much as 500 to 1,000 words in length. The following circular used at Camp Greenleaf is typical:

INFORMATION REGARDING PSYCHOLOGICAL EXAMINATION.

(For use of company commanders).

Purpose of the tests.—1. To classify men and officers according to their mental ability, thus supplementing the records of occupational qualifications and assisting in placement in the army.

2. To secure information regarding the mental strength of organizations.

3. To assist in selecting men of superior mental ability, who should be considered for promotion, and for tasks of special responsibility.

4. To aid in the segregation or elimination of the mentally defective.

Men possessing a moderate degree of English literacy take group examination alpha; the illiterates and foreign take group examination beta; men of exceptionally low intelligence later are examined individually.

[Here followed a statement of the basis for assignment of letter grades.]

Grades A and B are the grades typically obtained by officers; C grades by privates; D grades by men of inferior intelligence; E grades by dull laborers and by men either feeble-minded or bordering upon feeblemindedness.

These tests do not measure occupational fitness nor educational acquirement; they measure *intellectual ability.* This latter has been shown to be important in estimating military value, since many thousand rankings of men by their officers agree very closely with the results of the tests.

Psychological rating should be supplemented by knowledge of personal appearance, energy, military knowledge possessed, etc., if used as a basis of promotion.

Because of the uneven value of the explanatory circulars issued in the camps it was decided to provide a standard form for general use. The following statement was then accordingly prepared in the office of the Surgeon General and forwarded to the camps with the request that it be used, with such changes as special conditions in any given camp might necessitate.

EXPLANATION OF INTELLIGENCE GRADES.

The purpose of the psychological tests.—In no previous war has military efficiency depended so much upon the prompt and complete utilization of the intelligence of the individual soldier. The purpose of the psychological tests is to give a quick and fairly accurate classification of the men according to general intelligence. They aid:

(*a*) In the discovery of men whose superior ability recommends their advancement.

(*b*) In the prompt segregation in Development Battalions of intellectually inferior men whose inaptitude would retard the training of the unit.

(*c*) In building organizations of equal or appropriate strength.

(*d*) In selecting suitable men for various army occupations or for special training in technical schools.

(*e*) In eliminating the feeble-minded.

What the tests measure.—The tests give a reliable index of a man's *ability to learn, to think quickly and accurately, to analyse situations, to maintain a state of mental alertness, and to comprehend instructions.* They do not measure loyalty, bravery, dependability, or the emotional traits that make a man "carry on." A man's value to the service is measured by his *intelligence, plus other necessary qualifications.*

What the grades mean.—All men are classified by the tests as A, B, C+, C, C−, D, DD−, or E, as follows:

A. Very superior intelligence.—High officer type when backed by other necessary qualities.

B. Superior intelligence.—Commissioned officer type and splendid sergeant material.

C+. High average intelligence.—Good N. C. O. material with occasionally a man worthy of higher rank.

C. Average intelligence.—Good private type, with some fair to good N. C. O. material.

C−. Low average intelligence.—Ordinary private.

D. Inferior intelligence.—Largely illiterate or foreign. Usually fair soldiers, but often slow in learning.

D−. Very inferior intelligence, but considered fit for regular service.

E. Mental inferiority, justifying recommendation for Development Battalion, special service organizations, rejection or discharge.

The grades should be consulted.—(*a*) In the selection of candidates for officers' training schools; (*b*) in the selection of all noncommissioned officers; (*c*) in balancing organizations; (*d*) in picking men for special detail; (*e*) in the classification and training of men in Development Battalions; (*f*) in court cases; (*g*) in the better understanding of men who are in any way peculiar or exceptional. (*h*) the tests have also been used effectively in the selection of nurses, Y. M. C. A. personnel, etc.

Important points.

1. Commissioned officer material is found chiefly in the A and B groups. Men grading C+ should be accepted for O. T. C. only after careful scrutiny.

2. The majority of noncommissioned officers rate A, B, or C+. Men below C+ should not be entrusted with complicated paper work.

3. D men are rarely suited for tasks requiring special skill, forethought, resourcefulness or sustained alertness.

4. It is unsafe to expect D or E men to read and understand written directions.

5. Only high score men should be selected for tasks that require quick learning and rapid adjustments.

6. A man's value to the service should not be judged by his intelligence rating alone.

CHAPTER 11.

PERFORMANCE IN INTELLIGENCE EXAMINATIONS AS RELATED TO OFFICERS' ESTIMATES OF INTELLIGENCE.

SECTION 1.—*Alpha and beta and intelligence ratings.*

The use of intelligence ratings based on alpha and beta scores in the Army assumes that intelligence, or, more accurately, the sort of ability that is measured by these two examinations, is a very important factor in the complex that determines a man's value in the military service. Evidence in various forms has sufficiently demonstrated the value of the alpha and beta tests as measures of the ill-defined quality designated as "military value." The question of the efficiency of the alpha and beta tests in diagnosing grades of "intelligence," as estimated by Army officers in the military environment, but exclusive as far as possible of other factors that are undoubtedly of considerable importance in the determination of military value, will be studied in this section.

For the purposes of this study material has been obtained from three camps—Beauregard, MacArthur, and Meade. There are difficulties in obtaining material for a study of this kind, especially in the drafting of a rating scale and instructions for its use that will insure a high degree of qualitative and quantitative resemblance between the ratings made by different officers, and in putting the scale into effect in very large units, where the personnel has remained the same for several months. Clearly, an officer must have had several months of close contact with a group of 200 men before he can rate them even moderately well.

In Camp Meade the Seventy-second Infantry cooperated with the Psychological Examining Board in furnishing ratings of approximately 900 of its men. This regiment had been relatively stable as regards personnel for a period of about four months previous to the time the ratings were made. The men had not been given psychological examination, and, of course, the results of the experimental examination were not communicated to the officers until the ratings had been made. The rating scale and instructions as given to the officers are reproduced verbatim herewith:

INSTRUCTIONS FOR RATING INTELLIGENCE.

1. Disregard everything about a man except his general intelligence.
2. By intelligence is meant ability to think quickly, accurately, and independently; to comprehend new problems; to meet new and difficult situations; to understand and to be able to carry in mind complicated directions, etc.
3. With this definition of intelligence in mind rate the intelligence of each man in your company whom you know, by placing before his name the number of the class in which he belongs, in accordance with the following scale:
   7 means intelligent as the *average commissioned officer.*
   6 means intelligent as the *average sergeant.*
   5 means intelligent as the *average corporal.*
   4 means intelligent as the *average private.*
   3 means intelligent as a *poor private.*
   2 means intelligent as an *extremely poor private.*
   1 means barely intelligent enough for *labor battalion.*
4. Remember that *intelligence alone* is to be considered. For example, grade a man 7 if he is *as intelligent* as the average commissioned officer. For many reasons he might be unfit to be an officer, but this does not matter. We are concerned here only with *intelligence.*
5. In rating an individual *avoid being too much influenced by his rank.* Remember that some privates are as intelligent as an average commissioned officer; that some corporals are more intelligent than some sergeants, etc.

This scale defines the various grades of intelligence entirely in terms of military status, but expressly forbids taking the individual's status into account in determining his rating.

Independent ratings of the same men by two or more officers were not requested. It is not possible to state whether the rating of one man originated with one officer only, or as the combined judgment of two or three in conference, nor can it be said whether all the men in a given company were rated by the same officer. There is good reason to believe that all the ratings were painstakingly made, and are thus of considerable value, for the rating officers had had four months of acquaintance with their men, and the regimental adjutant urged upon the officers the desirability of careful judgments in the interests of scientific investigation.

Examinations alpha, beta, and *a* were used and the distribution of men by companies, groups, and procedures is given in Table 80. No segregation was made. Every man, illiterate or otherwise, took both examinations of the pair given his group.

TABLE 80.—*Distribution of men by companies, groups, and examinations—Camp Meade.*

Examination group.	Company.						Total.
	B	F	I	H	K	Non-specified.	
Alpha before beta	149	.....	.....	74	23	3	249
Beta before alpha	17	.....	.....	86	67	5	175
Alpha before *a*	.....	101	108	.....	47	2	258
a before alpha	.....	89	100	.....	45	2	236
Total	166	190	208	160	182	12	918

In Camps Beauregard and MacArthur the cooperation of several organizations was obtained. *Three* independent ratings of each man were requested according to the following scale:

INSTRUCTIONS FOR RATING MEN ON GENERAL INTELLIGENCE.

1. An estimate of the general intelligence of each man in your company, of whose mental capacity you have been able to form even a rough notion, is desired from you.

2. Beside each man's name enter the number representing the class of intellectual ability in which you think he belongs.

3. The classes of intelligence to be used are as follows: Class 7, very superior; class 6, superior; class 5, high average; class 4, average; class 3, low average; class 2, inferior; class 1, very inferior.

4. The following points should be noted carefully:

(*a*) The above scale refers *only to intelligence*, not to personality in general, total military value, etc.

(*b*) It is meant to cover all ranges of intelligence which you have observed among enlisted men, not merely the range from the brightest to the dullest of your own particular group.

(*c*) It follows that 1 and 7 represent fairly extreme cases, one or the other of which may not have many representatives in the group under consideration.

This scale is much less specific in its definition of the various grades of intelligence than is the scale used in Camp Meade, but, on the other hand, is probably less completely restricted to the military point of view. The Camp Meade scale is obviously pretty exactly defined by the normal selective agencies of the Army. To use the scale one has only to know enough corporals, sergeants, etc., in order to estimate the averages required and then compare this result with the mentality of the individuals to be rated.

The various grades of the scale are thus fixed absolutely as well as relatively. The scale used in camps Beauregard and MacArthur, in so far as it is defined in general terms, having no absolute meaning, suffers in comparison with the Meade scale.

The cases selected for study are as follows:

Camp Beauregard, Twenty-ninth Infantry: Company A, 32 cases; Company B, 36 cases; Company C, 40 cases; Company D, 46 cases; Company E, 61 cases; Company F, 56 cases; Company G, 62 cases; Company H, 44 cases; total, 377 cases.

Camp MacArthur, Fifth Battalion, Infantry Replacement Camp: Company G, 144 cases; Company H, 154 cases; total, 298 cases.

TABLE 81.—*Individual officers' estimates.*

Rating.	Twenty-ninth Infantry, Camp Beauregard.																								Fifth Battalion, Infantry Replacement Camp, Camp MacArthur.					
	Company A.			Company B.			Company C.			Company D.			Company E.			Company F.			Company G.			Company H.			Company G.			Company H.		
	Officers.																								Officers.					
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
7	...	...	...	1	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	1	...
6	1	...	1	1	...	1	...	...	...	...	5	5	2	...	...	3	...	...	11	...	...	...	...	5	4	4	4	21	2	3
5	3	0	5	2	2	4	2	4	3	3	9	9	7	...	...	19	8	5	18	5	3	1	10	15	14	40	23	52	20	7
4	10	13	9	11	11	9	13	8	2	5	30	30	19	...	...	28	47	25	6	39	8	31	16	19	80	58	73	53	119	130
3	9	5	9	8	7	2	14	15	11	36	1	1	26	...	...	4	1	20	14	17	18	9	16	2	38	37	38	18	12	12
2	2	...	8	7	...	...	4	5	15	2	...	...	6	...	...	2	...	6	10	...	24	3	1	2	7	4	3	7	...	2
1	...	...	...	6	...	...	...	...	5	...	...	...	1	...	...	...	...	...	3	...	6	...	1	1	...	1	3	1	...	...
...	[1] 7	[1] 10	...	...	[1] 16	[1] 20	[1] 7	[1] 8	[1] 4	...	...	...	[1] 61	[1] 61	...	...	...	...	...	[1] 1	[1] 3	...	...	...	[1] 1	...	...	...	...	...

[1] Not rated.

Table 81 gives the distributions of ratings of the cases studied, for each individual officer. It is at once apparent that we are dealing with a great diversity of conceptions of intelligence. Some officers have been very conservative in assigning very high or very low ratings. One officer rates nearly all of a group average or above and another rates the same men all average or below. One officer rates 85 per cent of a large group 4 or average. Another officer rates only 34 per cent of the same group 4. It is therefore apparent that officers differ:

(*a*) In their notions of the length of range of intelligence represented by each class.

(*b*) In their notions of what constitutes "average" intelligence.

(*c*) With respect to the part of the range of intelligence in which they discriminate, or attempt to discriminate, different grades of intelligence.

All of the cases were examined by alpha and beta, approximately half of them taking alpha first and the other half taking beta first. In working out correlations of tests with ratings the order of the examinations has been disregarded and all cases treated together, since no effect upon second examination scores of the experience of a first examination of either kind was evident. Correlations were first computed for total beta and alpha scores, and scores on separate beta and alpha tests with combined officers' ratings. The combination of ratings was effected as follows: For the great majority of cases having three ratings, the three numerical values were simply added together. Cases having only two ratings were given a combined rating obtained by multiplying by 3 half the sum of the two ratings, and in the few cases where only one rating was available, its numerical value was multiplied by 3. Thus the scale of *possible* ratings extends from 3 to 21.

For all correlations of total scores with ratings, beta scores have been classified in 5-point intervals and alpha scores in 10-point intervals. All standard deviations given at the bottom of correlation tables are in terms of class intervals. The standard deviation of ratings is denoted by the symbol σ_R and the standard deviation of scores by the symbol σ_{SC}.

Tables 82 to 91 are a series of typical frequency surfaces for ratings and total (raw) alpha or beta scores.

TABLE 82.—*Alpha raw total—alpha-before-beta (Meade).*

Officers' ratings.	Alpha score.																					Total.
	0–9	10–19	20–	30–	40–	50–	60–	70–	80–	90–	100–	110–	120–	130–	140–	150–	160–	170–	180–	190–	200–	
7	...	...	...	...	...	...	...	...	1	1	3	3	3	3	1	1	1	2	2	...	...	21
6	1	...	2	2	5	6	2	5	1	2	6	4	7	4	3	1	1	2	...	2	.	56
5	3	5	4	7	8	7	6	5	1	3	2	6	4	1	...	...	...	...	...	...	..	58
4	14	13	11	6	6	6	5	2	4	2	1	...	...	...	...	...	...	...	...	...	..	73
3	9	9	2	2	4		2		1	2	...	...	...	...	...	...	...	...	...	...	..	31
2	7	...	1	...			1	...	...	...	...	...	...	...	...	...	...	...	...	...	..	9
1	1	...	...	...			...	...	...	...	...	...	...	...	...	...	...	...	...	...	..	1
Total	35	27	20	17	19	19	16	12	8	10	15	13	14	8	4	2	2	4	2	2	.	249

$\sigma_R = 1.29162$
$\sigma_{SC} = 4.80358$
$r = 0.671 \pm 0.023$

TABLE 83.—*Alpha raw total—beta-before-alpha (Meade).*

Officers' ratings.	Alpha score. 0–9	10–19	20–	30–	40–	50–	60–	70–	80–	90–	100–	110–	120–	130–	140–	150–	160–	170–	180–	190–	200–	Total.
7							1	2	1	1		2		1				1				8
6	1			1	4	1	3	1	2	2	1		3		3	1	2	1				25
5	3		3	4	4	4	2	5		1	1	1	3	2	2	2						34
4	8	5	4	11	5	4	8	2	7	1		1	3	1	1							63
3	1	8	4	1	1	2			1	2												20
2	4	2	2			1				1												10
1	1	4		1			1										1					7
Total	18	22	13	20	14	12	14	10	11	8	2	4	9	4	6	3	3	2				177

$\sigma_R = 1.37967$ $\sigma_{sc} = 1.54181$ r=0.462 ±0.040

$\sigma'_R = 1.36015$ $\sigma'_{sc} = 4.15766$ r'=0.511 ±0.038

[1] This case is clearly so inconsistent with the total correlation system that it should not be included. σ'_R, σ'_{sc} and r, above, are the constants of the system when this case is included. σ'_R, σ'_{sc} and r' are the corresponding constants when it is excluded.

TABLE 84.—*Alpha raw total—alpha-before-examination a (Meade).*

Officers' ratings.	Alpha score. 0–9	10–19	20–	30–	40–	50–	60–	70–	80–	90–	100–	110–	120–	130–	140–	150–	160–	170–	180–	190–	200–	Total.
7								1	1	2	2	1	1	2		1	1					12
6			1		1		2	5	6	7	6	4	5		1	1	1					42
5				3	7	1	4	8	9	8	3	2	3	1		1						62
4	12	11	17	6	14		10	3		5	2	4		1								108
3	2		9	4	2		1		2	1		1										30
2	3																					3
1		1																				1
Total	25	23	28	13	19	23	17	21	[illegible]	20	13	12	9	4	1	3	2				1	258

$\sigma_R = 1.[illegible]$
$\sigma_{sc} = 4.10915$
r=0.567 ±0.028

TABLE 85.—*Alpha raw total—MacArthur.*

Combined officers' ratings.	Alpha score. 0–9	10–19	20–	30–	40–	50–	60–	70–	80–	90–	100–	110–	120–	130–	140–	150–	160–	Total.
19										1								1
18						1												1
17									1			1						2
16					2	1			1	1	1					1		7
15		1				2		1	1	1		1	3					14
14			1		1	2	3	3	2	1			1	1		2		19
13	1	2	5	5	11	6	9	4	7	7	5	2		3		2		69
12	3	3	11	8	13	12	9	7	9	2	5	1		2				85
11	3	7	5	8	5	6	6	4	2	1	4	1		1		2	1	56
10	2	7	4	2	4	3	2		1		1		1					27
9	1	1	1	3							1		1					8
8			1	1														2
7	3	1																4
6	1		1															2
5	1																	1
Total	15	23	29	33	36	33	29	19	24	14	17	6	6	7		7	1	288

$\sigma_R = 1.8204$
$\sigma_{sc} = 3.5913$
r=0.353 ±0.034

TABLE 86.—*Alpha raw total—Beauregard.*

Combined officers' ratings.	Alpha score.																			Total.
	[illegible]	10–19	20–	30–	[illegible]	50–	[illegible]	70–	[illegible]	90–	100–	110–	120–	130–	140–	150–	160–	170–	180–	
19															1					1
18												2								2
[illegible]		1	1					1			1									4
16	1	1									2	1							1	6
15			1		3	1	2		2	2	3			1	1					19
14					4	1	5	1	1	4	2			1	1					22
13				1	1	1	2	2	6	3	2	1	4		1					38
[illegible]	5	6	12		11	5	3	1	2	5	2	2	1	1	1		1			67
[illegible]		12	12		7	4	7	2			1				1					66
[illegible]	4			5	4	2	2	1	1				1							28
[illegible]		12		8	3	13	3	2	5			1								57
[illegible]	2	4	3	2	1	3	1		1	2										19
[illegible]	2	1	1		2					1										17
6	4	1	3		3	1		1						1						21
[illegible]		1	1	1																3
[illegible]																				
3	2	1			2	1			1											7
Total	42	55	50	8	46	32	25	19	17	17	13	7	6	4	6		1		1	377

$\sigma_B = 2.7923$
$\sigma_{AC} = 3.8808$
$r = 0.418 \quad \pm 0.029$

TABLE 87.—*Alpha raw total—MacArthur—Company H, Fifth Battalion, Infantry Replacement Camp.*

Combined officers' ratings.	Alpha score.																	Total.
	0–9	10–19	20–	30–	40–	50–	60–	70–	80–	90–	100–	110–	120–	130–	140–	150	160–	
19										1								1
18																		
[illegible]									1			1						2
[illegible]					2	1				1						1		5
[illegible]		1		3		1	1	1		1		1	1					10
14			1	2	1	1	1	1	2	1			1	1				12
13	1	2	1	3	7	5	6	3	5	1	3			2		1		43
[illegible]		3	6	7	7	6	5	6	7		1							48
11	2	3	2		1	2	1	2	2	1	1					1		18
[illegible]	1		2		2	2	1				1							9
9	1		1															4
[illegible]				1														1
7	1																	1
Total	6	9	13	18	20	18	15	13	17	9	6	2	2	3		3		154

$\sigma_B = 1.7112$
$\sigma_{AC} = 3.5608$
$r = 0.336 \quad \pm 0.04$

TABLE 88.—*Beta raw total—alpha before beta (Meade).*

Officers' ratings.	Beta score.																								Total.
	0–4	95–	10–	15–	20–	25–	30–	35–	40–	45–	50–	55–	60–	65–	70–	75–	80–	85–	90–	95–	100–	105–	110–	115	
7															1		5	1	5	2	5	1		1	21
[illegible]						1				2	1	1		2	7	3	5	6	7	8	6	4	2		56
[illegible]										1		3		2	3	7	5	12	5						58
[illegible]				1								1	5		5	6		3			1				23
3	1			3		3		2	1		2	1	3		1	2		1							31
[illegible]				1				2				1	1												9
[illegible]				1																					1
T	1	4	2	5	9	8	8	4	2	5	15	10	13	12	17	18	20	23	19	16	12	5	3	1	249

$\sigma_B = 1.[illegible]$
$\sigma_{AC} = 5.4954$
$r = 0.647 \quad \pm 0.025$

TABLE 89.—*Beta raw total—alpha after beta (Meade).*

Officers' ratings.	Beta score.																									Total.
	0–4	5–9	10–	15–	20–	25–	30–	35–	40–	45–	50–	55–	60–	65–	70–	75–	80–	85–	90–	95–	100–	105–	110–	115–	120–	125–	
7											1		1				4	1		1	1						8
6								1	1		1		2	2	1	4	3	4	2		2		2	1	1	1	28
5								4			2	1	2	2	2	4	5	3	4	3	2	2	1				37
4		1	2		4	2	2	1	4	5	3	7	5	5	6	1	3	3	8		2						64
3		1				3		1	1	3	1	1	3	1	2	1	1	1									20
2		1		3	1	1		1	1				2														10
1				1	1	1	1		1				1							[1] 1							7
Total		3	2	4	6	7	3	8	8	8	8	9	16	10	11	10	16	12	14	5	7	2	3	1	1	1	175

$\sigma_R = 1.37967$ $\sigma_{Rr} = 1.36016$
$\sigma_{sc} = 5.2773$ $\sigma'_{sc} = 5.2706$
$r = 0.519 \pm 0.037$ $r' = 0.588 \pm 0.033$

[1] See note on Table 83.

TABLE 90.—*Beta raw total—(MacArthur).*

Combined officers' ratings.	Beta score.																							Total.
	0–4	5–9	10–	15–	20–	25–	30–	35–	40–	45–	50–	55–	60–	65–	70–	75–	80–	85–	90–	95–	100–	105–	110–	115–	
19																									1
18																1									1
17																		1		1					2
16													1			1			1	4					7
15						2			1	1		1		2	1	1		1	1	2				1	14
14								1	1				2		4	3	2		1	1	4				19
13				2		1	1		2	2	4	1	6	6	6	10	8	7	9	4					69
12						1	3	3	2	1	7	6	16	4	11	10	4	6	8	1	2				85
11		1				1	1	2	3	3	6	3	5	6	5	5	2	6	3	3	1				56
10				1		1	4	3	1	5	1	1	2	2	1	2		1	2						27
9									1		2		1	1		1		1		1					8
8									1	1															2
7	1		1				1				1														4
6										2															2
5		1																							1
4																									
3																									
Total	1	2	1	3		6	10	9	12	15	21	12	33	21	28	34	17	23	25	17	7			1	298

$\sigma_R = 1.8230$
$\sigma_{sc} = 4.1353$
$r = 0.379 \pm 0.033$

TABLE 91.—*Beta raw total—(Beauregard).*

Combined officers' ratings.	Beta score.																							Total.
	0–4	5–9	10–	15–	20–	25–	30–	35–	40–	45–	50–	55–	60–	65–	70–	75–	80–	85–	90–	95–	100–	105–	110–	
17																	1							1
16																				1	1			2
15										1	1					1	1							4
14		1									1						1	2					1	6
13								1		1	1				3	2	1	4	1	1	2	2		19
12									2	1	2	2		1	4	4	2	5	1	2				22
11			1	1			1	1	2	4		5	1	3	2	5	2	4	2	3	2	1		38
10	1		1	1	2	1	3	3	3	4	3	2	3	3	10	6	6	9	3		2	1		67
9			2		1	4	6	4	9	3	4	6	9		4	7	3	2	1				1	66
8			2			1	1	2	1	2	4	4	2	1	4	3	1							28
7		1	2		3	2	3		6	5	7	5	4	3	2	3	4	5	2					57
6						2	1	1	2		1	2	4	2		2	1	1						19
5			2	3	2	2	3			1		1						3						17
4		1	1				3	3		1	1	2	3		1		2	2		1				21
3					1						1			1										3
2			1				1	1			1	1		1			1							7
Total	1	3	12	5	9	12	22	16	26	22	25	30	26	18	29	30	32	30	12	7	6	3	1	377

$\sigma_R = 2.7915$
$\sigma_{sc} = 4.6909$
$r = 0.320 \pm 0.031$

The correlation coefficients and standard deviations of scores for Tables 82 to 91 are brought together in the following table:

ALPHA CORRELATIONS.

Group.	r.	σ_{sc}.
Alpha before beta (Meade)	0.671 ± 0.023	4.8336
Beta before alpha (Meade)	.511 ± .038	4.4577
Alpha before α (Meade)	.567 ± .028	4.0092
MacArthur (all alpha)	.353 ± .034	3.5913
Beauregard (all alpha)	.418 ± .029	3.5808
Company H, Fifth Battalion, Infantry Replacement Camp (MacArthur)	.336 ± .048	3.2638

BETA CORRELATIONS.

Group.	r.	σ_{sc}.
Alpha before beta (Meade)	0.647 ± 0.025	5.3454
Beta before alpha (Meade)	.588 ± .033	5.2706
MacArthur (all beta)	.379 ± .033	4.1353
Beauregard (all beta)	.320 ± .031	4.6906
Company H, Fifth Battalion, Infantry Replacement Camp (MacArthur)	.379 ± .047	4.0403

None of these groups can be regarded as even approximately unselected. Induction into the Army was "selective" to an unknown but probably high degree. Further, the continual sifting and transferring of men within the Army itself produces in even short periods of time groups (companies, e. g.) of varying but high degrees of "selectedness." A glance at the standard deviations of scores, which are relatively objective measures, shows that the groups listed above vary widely in "selectedness." It is well known that selection affects a coefficient of correlation for any pair of measures of the selected group, and that the higher the degree of selection the lower will be the correlation. It follows, therefore, that correlation coefficients calculated for two groups which differ in degree of "selectedness" are not directly comparable.

Pearson[1] has shown that if r_{xy} be the correlation between two variates for an unselected group, in which the standard deviation of the variate x is σ_x, the correlation between the variates x and y in a group in which the standard deviation of the x variate has been reduced by selection to s_x, is given by the formula—

$$(r)_{xy} = \frac{s_x}{\sigma_x} \frac{r_{xy}}{\left\{1 - \left[1 - \frac{s_x^2}{\sigma_x^2}\right] r^2_{xy}\right\}^{\frac{1}{2}}}$$

where $(r)_{xy}$ is used to denote the coefficient of correlation in the selected group. Or if $(r)_{xy}$ is given, and also the values of the two standard deviations, we can solve the above equation for r_{xy} and thus find the degree of correlation in the unselected, or relatively less stringently selected, group. The formula is—

$$r_{xy} = \frac{(r)_{xy}}{\left\{\frac{s^2_x}{\sigma_x^2} + \left[1 - \frac{s^2_x}{\sigma_x^2}\right](r)^2_{xy}\right\}^{\frac{1}{2}}}$$

By means of this formula, using the alpha before beta group as the standard, since the standard deviations of scores of both alpha and beta for this group are the largest values obtained, the correlations for the other groups can be adjusted to the degree of "selectedness" of this group and thus made comparable. The results of such an adjustment are as follows:

ALPHA CORRELATIONS.

Group.	Raw r.	Adjusted r.
Alpha before beta (Meade)	0.671	(0.671)
Beta before alpha (Meade)	.511	0.542
Alpha before α (Meade)	.567	.638
MacArthur (all alpha)	.353	.453
Beauregard (all alpha)	.418	.528
Co. H, Fifth Battalion, Infantry Replacement Camp (MacArthur)	.336	.467

[1] K. Pearson, Trans. Roy. Soc., Series A, vol. 200, pp. 1–66.

BETA CORRELATIONS.

Group.	Raw r.	Adjusted r.
Alpha before beta (Meade)	0.647	(0.647)
Beta before alpha (Meade)	.588	0.593
MacArthur (all beta)	.379	.468
Beauregard (all beta)	.320	.359
Co. H, Fifth Battalion, Infantry Replacement Camp (MacArthur)	.379	.475

Thus the elimination of the factor of "selectedness" of groups does not eliminate the differences in degree of correlation between ratings and scores. These differences might be due to:

(*a*) Qualitative differences in standards by which the men of the different groups were rated.

(*b*) Nearer approach to accuracy in the ratings of some groups than in others, because of officers' longer acquaintance with men, or differing degrees of ability to "size up" men.

(*c*) Lowering of correlation by throwing together in the same table a considerable variety of ratings, as ratings from several different officers. It will be seen from table 81 that subjective ratings are essentially the class marks of ranked classes, and not measures upon an absolute scale. Therefore if these class marks are averaged we obtain different means from different officer's ratings of the same group of men.

As regards (*a*) it is to be noted that the correlation of total alpha scores with ratings in the MacArthur group is lower than the similar correlation for the Beauregard group, while the contrary is true of beta total scores correlations. Owing to the imperfect standardization of procedure in the beta examination, this should be taken as merely suggestive of qualitative differences in rating standards, however.

With respect to (*b*) above we have the information that the Camp Meade ratings were made by officers who had known their men for at least three months, while the great majority of MacArthur and Beauregard cases had been under the observation of their officers for six weeks or less. This point will be discussed at greater length later.

Further investigation of the point raised in (*a*) above, and any study of the problem of (*c*) requires detailed consideration of the correlations of separate alpha and beta tests with ratings, in the groups already cited with reference to total scores, and also in smaller groups rated by the same officer or officers throughout.

Tables 92 and 93 give correlations and standard-deviations of the separate tests of alpha and beta, respectively. The standard deviations of scores in alpha tests indicate two things at once—viz, that the groups differ appreciably in "selectedness" in the same way as indicated by the total scores, and that there is little if any qualitative variation among groups. The only evidence against the latter conclusion is the exceptional standard deviation of test 4, beta before alpha group, which is larger than the standard deviation of test 4 for the alpha before beta group, while in all other tests the standard deviations are greatest for the alpha before beta group. This divergence is very small, however.

TABLE 92.—*Correlations of alpha tests with officers' ratings.*

Test.	Group.	Alpha before beta.	Beta before alpha.	Alpha before a	Beauregard and MacArthur.
1	r	0.571±0.029	0.526±0.037	0.428±0.034	0.399±0.022
	σ_{sc}	3.4531	3.1930	3.0851	2.7717
2	r	.606± .027	.461± 0.40	.401± .035	.398± .022
	σ_{sc}	4.6473	4.2157	3.7625	3.5643
3	r	[illegible]	.410± .043	.443± .034	.409± .022
	σ_{sc}	4.4676	4.2369	3.8844	3.8452
4	r	[illegible]	.449± .041	.475± .033	.363± .023
	σ_{sc}	[illegible]	[illegible]	4.2217	4.1397
5	r	.607± .027	[illegible]	[illegible]	.319± .023
	σ_{sc}	6.7545	6.4165	5.8629	5.7815
6	r	.593± .028	[illegible]	.468± .033	.333± .023
	σ_{sc}	[illegible]	4.5428	4.1605	3.9388
7	r	.573± .029	.373± .044	.459± .033	.287± .024
	σ_{sc}	4.5074	4.2091	3.8749	3.3425
8	r	[illegible]	[illegible]	[illegible]	.345± .023
	σ_{sc}	[illegible]	5.1833	5.0548	4.1824

TABLE 93.—*Correlations of beta tests with officers' ratings.*

Test.	[illegible]	Alpha before beta.	Beta before alpha.	[illegible] and MacArthur.
1	r	0.296±0.039	0.172±0.050	0.162±0.025
	σ_{sc}	[illegible]	1.1769	1.3192
2	r	[illegible]	[illegible]	[illegible]
	σ_{sc}	4.3335	4.3730	3.8524
3	r	.482± .033	.438± .041	[illegible]
	σ_{sc}	3.7796	3.7393	[illegible]
4	r	.594± .028	.534± [illegible]	[illegible]
	σ_{sc}	8.1199	7.8026	[illegible]
5	r	.550± .030	.452± .041	.349± .023
	σ_{sc}	[illegible]	7.0189	[illegible]
6	r	.549± .030	.456± .040	[illegible]
	σ_{sc}	5.0447	4.3443	4.0970
7	r	.463± .034	.420± .042	.231± .023
	σ_{sc}	[illegible]	3.1526	[illegible]

As is the case of the correlations with total score it seems desirable to adjust these correlation coefficients to a common basis. Since the alpha before beta group has the largest standard deviations (with the one exception noted above) it has been chosen as the standard. The adjusted correlation coefficients for the alpha tests are given in Table 94.

TABLE 94.—*Alpha tests.*

Test.	Group.						
	Alpha before beta (raw r).	Beta before alpha.		Alpha before *a*.		Beauregard and MacArthur.	
		Raw r.	Adjusted r.	Raw r.	Adjusted r.	Raw r.	Adjusted r.
1	0.571	0.526	0.556	0.428	0.468	0.399	0.477
2	.606	.461	.497	.401	.476	.398	.492
3	.606	.410	.428	.443	.494	.409	.462
4	.588	.449	.437	.475	.510	.363	.401
5	.607	[illegible]	.453	.425	.476	.319	.366
6	.593	.462	.476	.468	.515	.333	.390
7	.573	.373	.395	.459	.515	.287	.375
8	.623	.518	.561	.694	.741	.345	.454

The standard deviations of beta tests for the different groups are not so uniform as the standard deviations of alpha tests. Especially outstanding are the differences between groups beta before alpha and Beauregard MacArthur with respect to test 2, and groups alpha before beta and beta before alpha with respect to test 6. These divergences tend to confirm the suspicion already formed that there has been lack of uniformity in the examination procedure. If this has been the fact the comparison of ratings from the point of view of the beta tests, and the converse comparison of the beta tests on the basis of ratings, will be of somewhat impaired validity. With this reservation the adjusted values of the correlation coefficients for the beta tests are given (table 95).

TABLE 95.—*Beta tests.*

Test.	Group.				
	Beta before Alpha (raw r).	Alpha before beta.		MacArthur–Beauregard.	
		Raw r.	Adjusted r.	Raw r.	Adjusted r.
1	0.172	0.296	0.312	0.162	[illegible]
2	[illegible]	.480	.483	[illegible]	.318
3	[illegible]	.482	.478	.214	.222
4	.534	.594	.579	.332	[illegible]
5	.452	.550	.562	.349	.420
6	[illegible]	.549	.492	.331	[illegible]
7	[illegible]	.463	.459	.231	.242

The results shown in tables 94 and 95 indicate a variability of correlation between ratings and test performance not to be explained away on the hypothesis of accidental factors. After the differences in the groups have been ruled out by the method of adjusting the correlation

coefficients to the same degree of individual variability for each group, we have, as an extreme case, the following contrasted results:

Test.	Group.	
	Alpha before *a*.	Beauregard-MacArthur.
Test 1 (Alpha)	r=0.468	r=0.477
Test 8 (Alpha)	r= .741	r= .454

If all the ratings of the men in each group had been made by one officer, the conclusion would be justifiable that the two officers had taken into account different sets of personal characteristics of the men they were rating, or, what is nearly the same thing, that they differed appreciably in their notions of what constitutes "intelligence." Since these two groups are actually made up of smaller groups rated by different officers, so that ratings from 28 different officers are thrown together in the Beauregard–MacArthur material, and at least three sets of ratings are combined in the alpha before *a* group, smaller groups, the members of which were all rated by one officer were studied to determine to what extent the divergent results from mixtures of different sets of ratings may be regarded as due to qualitative differences of ratings.

In the MacArthur material one group of 154 cases was found in which each had been rated independently by three different officers. The results obtained from this material are interesting in several respects.

The contingency of rating and score for each officer separately is shown in tables 96, 97, and 98.

TABLE 96.—*Company H, Fifth Battalion, Infantry Replacement Camp, MacArthur—Ratings by officer 1.—Alpha raw total.*

	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	Total.
7				1		1											2
6	1	1		4	2	2	1	1	3	3		1		1		1	21
5	1	5	3	3	8	4	7	4	5	5	2	1	1	2		1	52
4	1	2	6	7	8	7	5	7	7		2	1					53
3	2	1	3	1	1	2	1	1	2	1	2					1	18
2	1		1	1	1	2	1										7
1				1													1
Total	6	9	13	18	20	18	15	13	17	9	6	3	1	3		3	154

TABLE 97.—*Company H, Fifth Battalion, Infantry Replacement Camp, MacArthur—Ratings by officer 2.—Alpha raw total.*

	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	Total.
7										1							1
6										1		1					2
5		1	1	2	3	3	1	2	1	1	1	1	2			1	20
4	2	6	10	14	16	15	14	11	16	6	4			3		2	119
3	4	2	2	2	1						1						12
Total	6	9	13	18	20	18	15	13	17	9	6	2	2	3		3	154

TABLE 98.—*Company H, Fifth Battalion, Infantry Replacement Camp, MacArthur—Ratings by officer 3.—Alpha raw total.*

	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	Total.
6									1	1		1					3
5					2		1			1			2			1	7
4	1	6	10	17	17	18	14	12	16	7	6	1		3		2	130
3	4	3	3		1			1									12
2	1			1													2
Total	6	9	13	18	20	18	15	13	17	9	6	2	2	3		3	154

It is evident that, although Table 96 might be treated by ordinary product-moment methods, Table 98 can not, owing to the small number of rows, and to the concentration of over 80 per cent of the total frequency into one row. Table 97 is intermediate in these respects.

The actual values of the product-moment coefficients from these tables are as follows:

Table 96, Officer 1, r = 0.171
Table 97, Officer 2, r = 0.321
Table 98, Officer 3, r = 0.411

but for the reasons stated above probably only the first of these is even approximately correct. We might apply a correction or class index correlation, by dividing each one of these coefficients by the corresponding $r_y C_y$ for the vertical marginal frequencies. The values of $r_y C_y$ for each table are (Pearson, Biometrika, vol. ix, pp. 116-139): – Officer 1, 0.9662; Officer, 2, 0.8242; Office 3, 0.7523. The resulting corrected values of the correlation coefficients are: Officer 1, 0.177; Officer 2, 0.397; Officer 3, 0.546. But suspicion is aroused against even these results by the results of application of the same corrections to contingency coefficients for each possible pair of officers.

To measure the agreement between officers in their ratings the following three contingency tables were formed:

Officer 2.	Officer 1.							Total.
	1	2	3	4	5	6	7	
7						1		1
6					1	1		2
5				3	6	10	1	20
4	1	5	14	46	43	9	1	119
3		2	4	4	2			12
Total	1	7	18	53	52	21	2	154

Officer 3	Officer 1.							Total.
	1	2	3	4	5	6	7	
6					1	2		3
5				1	3	3		7
4	1	5	16	48	43	15	2	130
3		1	1	4	5	1		12
2		1	1					2
Total	1	7	18	53	52	21	2	154

Officer 3.	Officer 2.					Total.
	3	4	5	6	7	
6			1	1	1	3
5			7			7
4	4	113	12	1		130
3	6	6				12
2	2					2
Total	12	119	20	2	1	154

The raw coefficients of mean square contingency calculated from these tables are as follows: Officers 1 and 2, 0.5045; officers 1 and 3, 0.4029; officers 2 and 3, 0.7390.

If we attempt to correct these contingency coefficients for class index correlation, we obtain an absurd result for the third, a quantity greater than 1. This result is due to the very low class index correlations for officers 2 and 3, 0.8242 and 0.7523, respectively. In other words, the assumption upon which the class index correction is based does not hold, for these two series of ratings at least. It is evident that both of these officers have given the rating of 4 (average intelligence) to a much greater proportion of individuals than might be reasonably supposed to be of average intelligence, even without taking their scores into consideration. Now the most reasonable explanation of this state of affairs is that these officers have rated a great many individuals 4 because they were required to give some rating, and their observation of the individuals in question had not been extensive enough to furnish them any reliable data upon which to base an estimate of intelligence. They therefore "played safe" and gave all such individuals ratings of 4.

The best method of calculating the correlation between ratings and scores would therefore be one which takes account only of those cases which the officer felt justified in rating higher or lower than "average." Such a method consists in calculating a "biserial" r.[1] Two such values may be calculated from the present data, one by taking all cases rated above average as the subgroup, and the other by taking all cases rated below average as the subgroup. The following results were obtained:

Officer 1:
- Subgroup—Above average $r=0.202\pm0.104$
- Subgroup—Below average $r=0.142\pm0.094$

Officer 2:
- Subgroup—Above average $r=0.304\pm0.101$
- Subgroup—Below average $r=0.539\pm0.080$

Officer 3:
- Subgroup—Above average $r=0.549\pm0.089$
- Subgroup—Below average $r=0.656\pm0.072$

Evidently the correlation of score with the ratings of officer 1 is insignificant, but the relatively high correlation of scores with the ratings of officer 3 lends support to the theory that this officer made his ratings very carefully, but followed the principle of rating all, concerning whom he had insufficient knowledge, 4, or "average." Presumably his inability to differentiate among the great majority of cases was due to the short period of time for which they had been under his observation. Officer 2 seems to have followed the same principle, but less rigidly. Officer 1 must have made his ratings very largely by sheer guess. This statement seems warranted by the evidence of the contingency coefficients given above, showing that his ratings agreed less with those of officers 2 and 3 than the ratings of these two agreed with each other. One more point seems worthy of notice. It is that both officers, whose ratings agree significantly with the total alpha scores of the men they rated, have chosen low-grade men more accurately than high-grade men, unless we suppose that the alpha examination discriminates between grades of ability in the lower end of the scale more efficiently than in the upper end of the scale. Other evidence indicates that the reverse of this is true, for some of the tests are so difficult that individuals of low intelligence fail to score on them, so that their total scores are simpler, and consequently less reliable composites.

It seemed not desirable to dismiss the ratings of officer 1 finally as being mere guesswork, until their correlation with the beta examination scores had been worked out. The standard deviation of scores of this group was found to be 4.04685 and $r=0.2231$. This value when adjusted to the common basis of "selectedness," as indicated by scores, becomes 0.2894. Thus, this officer's ratings have a slightly higher correlation with the beta scores than with the alpha scores of the same individuals, but the correlations in both cases are so low and subject to so many accidental factors that they need not be taken into account further.

After obtaining the relatively good results with the biserial r for the ratings of officer 3 it seemed desirable to work out similar coefficients for each alpha test. The following values were obtained:

TABLE 99.—*Company H, Fifth Battalion, Infantry Replacement Camp, MacArthur.—Officer 3, with scores.—(Biserial.)*

Test.	Subgroup above average.	Subgroup below average.
1	0.5237±0.0909	[illegible]
2	.4443± .0951	.6281± .0741
3	.5491± .0894	.7593± .0642
4	.5114± .0946	.4902± .0824
5	.3988± .0971	.4281± .0855
6	[illegible]	.5323± .0801
7	.3741± .0982	[illegible]
8	[illegible]	.5612± .0784

[1] Pearson, Biometrika, vol. 7, p. 96.

Although there is no definite information that the ratings of all men in a company in Camp Meade were rated by the same officer, the heterogeneity of ratings will certainly be considerably reduced for any particular group if that group is made up exclusively of men in one company. To carry out further the investigations of the effect of combining material more or less heterogeneous as to ratings, correlations between officers' ratings and separate tests of alpha have been calculated for the following groups: Company B, 149 cases; Company F, 101 cases; alpha before beta group—omitting all Company B men—74 in Company H, 23 in Company K, and 3 in company not specified.

TABLE 100—*Correlations between officers' ratings and separate tests of alpha.*

Test.	Group.	Company B.	Company F.	Alpha [illegible] omitting Company B.
1	[illegible]	0.591	0.520	[illegible]
[illegible]	[illegible]	3.3479	3.6083	3.6636
[illegible]	[illegible]	0.638	[illegible]	[illegible]
[illegible]	[illegible]	4.5558	3.5970	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	0.686
[illegible]	[illegible]	[illegible]	4.1196	4.3901
[illegible]	[illegible]	[illegible]	0.594	0.605
[illegible]	[illegible]	[illegible]	4.5830	4.8033
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	6.1178	[illegible]
[illegible]	[illegible]	[illegible]	0.533	0.617
7	[illegible]	[illegible]	[illegible]	4.7590
[illegible]	[illegible]	0.555	0.545	[illegible]
[illegible]	[illegible]	[illegible]	4.0656	4.5230
[illegible]	[illegible]	0.638	0.704	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	0.710
[illegible]	[illegible]	4.7182	[illegible]	4.9729

Adjustments of these coefficients to a common basis with Company F as the standard gives the following results, the correlations for the Company F group being repeated for the sake of comparison:

Test.	Company B.	Company F.	Alpha before [illegible] omitting Company B men.
1	0.550	0.520	0.488
2	[illegible]	.495	.472
3	[illegible]	.559	.663
4	.621	.594	.586
5	.579	.505	.548
6	.531	.533	.541
7	.516	.545	.607
8	.613	.704	.662
[illegible]	.631	.683	.644

These results, together with the biserial correlation coefficients for officer 3, MacArthur Infantry Replacement Camp, show a considerable tendency toward variation of coefficients for different sets of ratings. Not only does the rank order of tests change from group to group, but the range of variation of the eight coefficients fluctuates noticeably. All the coefficients for the Company B group above lie between 0.621 and 0.516, a range of 0.105. The coefficients for the Company F group vary from 0.495 to 0.704, a range of 0.209. Exact calculations of the appropriate probable errors can not be made, but if we consider the probable errors of the adjusted coefficients given above to be the same as for the unadjusted coefficients, the probable error of the difference between the largest and smallest coefficients obtained from Company B group, for tests 4 and 7, respectively, will be of the order of magnitude of 0.048, or somewhat less than half the actual difference. This probable error, it may be pointed out, involves not only the standard deviations of sampling for the two coefficients compared, but the correlation

between deviations of sampling of these same two coefficients, a quantity which is nearly as large as the correlation of the two variables, whose correlations with the third are being compared. In this case the correlation is between measurements by tests 4 and 7. The value used in the calculation of the probable error just given is taken as 0.50, which is probably too low.

When we consider the difference between correlations of tests 2 and 8 with ratings in Company F group it is evident, without actually calculating the probable error, that the difference is clearly significant of a certain kind of individuality of the ratings. Not only is the absolute value of the difference between coefficients, 0.209, much greater than in the case first discussed, by the correlation between tests 2 and 8 is greater, approximately 0.80. This latter condition would make the probable error smaller than in the previous case, other things being equal.

Without going deeper into the detailed (and idle) calculation of probable errors, since the samples are too small to justify greater refinement of this sort, it seems safe to conclude that the evidence indicates qualitative variability of ratings. Or, to state the fact differently, the set of correlation coefficients for the eight alpha tests for a group of individuals rated by a particular officer, is an indirect qualitative as well as quantitative analysis of that officer's judgments of the intellectual ability of the individuals he rated. Several sets of such correlation coefficients for several different officers (supposing no qualitative variation in the groups rated by them) constitute a qualitative and quantitative basis of comparison of these several officers' methods of estimating intelligence. The variability of the system of coefficients for the eight alpha tests would undoubtedly be greater if the intercorrelations were lower.

If the foregoing interpretation of the results obtained up to this point be the correct one, it follows that the use of subjective intelligence ratings in estimating the relative diagnostic values of a set of tests does not insure the best possible results. Within the limits set by the intercorrelations a set of tests can be made to measure a variety of aspects of ability by appropriate adjustment of weights. If the intercorrelations are high, the number of possible types of measurement is small, and vice versa. But even with the relatively high intercorrelations shown by the alpha tests, it is evident that multiple regression equations obtained from the different groups that have been discussed above would be quite different.

There might be, however, a resultant of the ratings by a large number of individuals that would constitute the ideal estimate of intelligence. This ideal measurement would, of course, necessarily be ideal by statistical definition, since no other definition is available. In order to obtain a reliable comparison of several tests as to their diagnostic efficiency a moderate number of estimates of intelligence of tested individuals would be needed from a large number of different persons, not a large number of estimates of intelligence by a relatively small number of persons, for the probable errors of the results would arise mainly not from the number of cases tested and rated, but from the number of cases furnishing the ratings. In practice such a scheme would meet another difficulty that is shown by the material of the present study. Inspection of Table 81 indicates that, as far as the ratings of Camps Beauregard and MacArthur were concerned, they were class ranks, rather than absolute measures. In the Camp Meade material there are only two companies which were examined exclusively by alpha as a first examination, or by alpha following beta. They were Companies B and K, and the following comparison of median scores and mean ratings is of interest:

	Median total score.	Mean rating
Company B	55.9	5.066
Company K	55.0	4.175

Although the differences are both in the same direction, they are out of all proportion to each other, and support rather than contradict the opinion that the apparent correlation is purely accidental. Furthermore, it seems a wholly gratuitous assumption that even the definitions and instructions furnished with the rating scale would enable the rating officers to do more than give class ranks when dealing with groups as nearly alike as the score distributions indicate them to be. It follows, therefore, that if we place all individuals rated "6," for ex-

ample, in the same class in our contingency table, whether they are all rated by the same person or not, the computed measure of relationship will be affected by factors other than those relevant to the problem.

The effect of such fortuitous factors is best seen from the following formula expressing the correlation and standard deviations of a combination of two distributions in terms of the component r's and standard deviations, and the difference of means:

$$N\sigma_x\sigma_y r_{xy} = N_1\sigma_{x1}\sigma_{y1}r_{x1y1} + N_2\sigma_{x2}\sigma_{y2}r_{x2y2} + \frac{N_1N_2}{N}(\bar{x}_1 - \bar{x}_2)(\bar{y}_1 - \bar{y}_2).$$

Thus the means of both variables being different in the two distributions, the third term of the above formula is not zero, and contributes to the magnitude of the correlation coefficient of the combined distribution. If, as in the present study, one of the variables, say x, is "rating," and we suppose ratings to be not absolute quantities, but class ranks, then the contribution of the third term in the formula to the correlation of the combined distribution is wholly irrelevant. It is necessary, therefore, to equalize the mean ratings of all groups before they are combined. This may be done by treating the class intervals on the rating scale as intervals on the axis of abscissae of a normal probability curve, their lengths determined by their frequencies, and their deviation values as best expressed by the deviation from the center of the normal curve of the mean of the segments whose bounding ordinates are thus fixed.

Summarizing, then, with reference to the three points raised on page 432:

(*a*) Qualitative differences in ratings do quite evidently exist, and it is suggested that in so far as one is limited to subjective estimates of intelligence for a comparison of tests, he should work for a *qualitative* mean, if such a term is permissible, by obtaining ratings made by as many different individuals as possible, rather than by multiplying the number of cases rated by the same individual. The latter procedure evidently reduces the accuracy of the ratings, whereas the greatest possible accuracy of each kind of rating is necessary. The point is again emphasized that, speaking in statistical terms, the kind of *sampling* dealt with is not of individuals tested and rated, but of *individuals rating* those who are tested.

(*b*) The analysis of the ratings of officer 3, Infantry Replacement Camp, MacArthur, brings out the relation between extensiveness of observation of the subject to be rated and the accuracy of this rating. The low correlations obtained from most of the Beauregard and MacArthur data are, therefore, to be regarded as mainly accounted for by the known brevity of period during which the officers had an opportunity to become acquainted with their men. Conversely, the same considerations lead to the conclusions that the Meade ratings are rather unusually accurately made.

(*c*) Ratings are essentially class ranks rather than absolute measures and should be treated accordingly. The low correlations from the Beauregard and MacArthur material are probably partially due also to the mixture in the same contingency table of many different sorts of ranks, thrown into classes according to the purely arbitrary class symbol with which they happened to be labeled.

The final problem is to obtain a correlation coefficient for each alpha and beta test from a composite mass of data, with the conditions that as many different kinds of ratings as possible shall be represented, and that these ratings shall be as accurate as possible. These conditions eliminate the Beauregard and MacArthur data, owing to the probable inaccuracy of the ratings, although by this elimination we sacrifice (probably, but not certainly) a great variety of ratings. In the Camp Meade material there are alpha and beta records of men from five different companies, so that at least five different rating officers are represented. There are 672 alpha cases and 416 beta cases available.

One further point needs to be considered. Thus far all correlations have been calculated without regard to the different lengths of effective range of the different tests. In other words, all correlations given so far are class-index correlations, and not correlations of the variates represented by the class indices. Thus the zero class interval has been treated as if of length equal to any other class interval.

No anthropologist would think of determining the correlation between height and weight of a human tribe from data obtained by the use of apparatus that allowed him to weigh accurately all individuals but allowed correct measurement of height of only the tallest 70 per cent, the remaining 30 per cent being recorded merely as not taller than a certain amount. This is precisely the case with certain of the alpha tests. The position is taken here that the alpha tests are different techniques for the measurement of a rather general, but ill-defined, attribute of the human being. It seems, therefore, that the comparison of techniques may be much more precisely made if the absolute efficiency of each is determined within the limits of its effective range, but stated as the value it would have if the technique in question were extended or extendable to cover an unlimited range, with supplementary information as to the exact nature and extent of the existing limitation. This is proposed as a needed improvement upon the highly inaccurate and sometimes misleading statement of correlation coefficients calculated uncritically from data containing relatively large proportions of unmeasured cases, which are falsely treated as measured cases.

The above proposal can be carried out in the following way: We calculate in the ordinary manner a product-moment r_i, but ignoring completely all cases in the zero-class interval, or if there is good reason to believe that scores of two or three points are accidental and nonsignificant in a great many cases, even these may be ignored. The resulting r_i is substituted in the formula:

$$r_c = \frac{r_i}{\sqrt{1 + (1 - r_i^2) J}}$$

where J is a quantity depending on the percentage of cases ignored during the calculation of r_i, and may be determined from Sheppard's tables by the following formula:

$$J = \frac{-hz}{\frac{1}{2}(1+\alpha)} - (z^{\frac{1}{2}}(1+\alpha))^2$$

For the normal correlation surface this formula is identical with (2), p. 8 and $J = \frac{s_x^2}{\sigma_x^2} - 1$.

Table 101 presents the correlation coefficients for each alpha and beta test, and for alpha and beta total scores, calculated for ratings treated as outlined on page 22, and corrected for length of range by formula (3). It is based upon the correlation tables, 102 to 118.

TABLE 101.—*Statistical constants.*

ALPHA TESTS (672 CASES).

Test.	M.	σ	Range.	Correlation with intelligence ratings.
1	3.2914	6.50	2σ ——→	0.5164
2	4.2843	7.57	−1.9σ —→	.5240
3	4.6923	5.72	−1.2σ —→	.5482
4	12.2411	6.98	−.6σ —→	.6051
5	7.2629	8.01	−1.1σ —→	.5126
6	4.6908	6.15	−1.3σ —→	.5347
7	10.7200	5.51	−.5σ —→	.5519
8	12.5200	12.52	−1.1σ —→	.6286
Total score	52.804	64.53		.6138 [1] .5867

BETA TESTS (416 CASES).

1	1.3368	4.33	←——+1.2σ	0.2051
2	3.8993	10.11	2σ ——→	.4802
3	3.7655	7.76		.4555
4	8.2890	16.38	2σ ——→	.5678
5	6.6498	14.12	−2σ ——→	.5198
6	4.8248	15.40		.4792
7	3.8188	5.71	1σ ←——+1.1σ	.5145
Total score	26.3445	66.54		.5798

[1] Total score (one [illegible]).

The deviations for the rating classes used in the calculation of Table 101 were obtained for each company separately, taking into account all ratings in the company, even though some of the cases are not actually in the contingency tables. This was considered a logical requirement of the supposition that ratings were to be treated as class ranks, rather than as absolute values. Since all of the men in a company who were rated at all were probably ranked individually, to a greater or less extent, as well as in classes, it seemed best to determine the deviation values for each rating class on the basis of the total frequencies in each class in the company. Thus the frequencies of each rating and the deviation values of the latter for each company are as follows:

Rating.	B		F		I		H		K	
	F	d	F	d	F	d	F	d	F	d
7	18	1.7137	9	2.0983	8	2.1646	8	2.0626	7	2.1749
6	52	.6533	16	1.3576	30	1.2525	22	1.2063	21	1.3356
5	43	−.1319	24	.8711	70	.3914	37	.5242	36	.6810
4	33	−.7895	83	.0675	86	−.6617	66	−.3379	76	−.1521
3	16	−1.4954	49	−.9586	8	−1.7249	18	−1.2923	31	−1.0592
2	4	−2.3532	8	−1.8987	3	−2.1298	6	−1.6230	8	−1.7230
1	0	.....	2	−2.6655	2	−2.6655	3	−2.4394	4	−2.3857
	166	.....	191	.....	207	.....	160	.....	183	.....

The data of Table 101 are the results of correction of the corresponding values of incomplete contingency tables for the limitations of range displayed by the various tests, in all cases except—

(*a*) Test 3, beta: The wide departure of the distribution of scores for this test from the approximately Gaussian type of all other distributions precludes correction of the type used for other tests.

(*b*) The range of test 6, beta, was clearly not limited, so far as this particular group of cases was concerned, as indicated by the vanishing frequencies at both ends of the scale.

(*c*) Beta total score: Although the component scales of beta are in most cases limited at one or both ends, the distribution of total scores of course does not show high terminal frequencies, and consequently the need for correction is not present. The results for beta total score are, however, not directly comparable with the results for its components; as, for example, mean total score with sum of separate test mean scores, owing to the fact that the latter are corrected, in one case for limitation at upper end (test 1), in another case (test 7) for limitations at both ends, and other cases, except tests 3 and 6, for limitations at lower end. The sum of these means, therefore, is the mean value of scores of constant heterogeneity at all levels, which beta raw scores obviously are not.

The corrections for several of the alpha and beta tests of nearly unlimited range actually result in values differing only insignificantly from the values that would have been obtained if the small degree of limitation had been ignored. But it has been considered best to treat all tests uniformly, in view of the necessity of special treatment of some, in order that the results may be more uniformly comparable.

The corrected value of the constants given for alpha total score are based on the incomplete contingency table of individuals scoring 30 points or more, on the supposition that toal scores below this value are unreliable, since usually not all of the component tests are represented. For comparison the uncorrected constants determined from the complete table, ignoring the obvious foreshortening of the scale, are given. The difference between corrected and uncorrected values is not great, but in agreement with the supposition of unreliability of the lower end of the alpha raw total scale.

TABLE 102.—*Correlation of intelligence ratings with score.*

Rating.	Alpha test 1.													Total.
	0	1	2	3	4	5	6	7	8	9	10	11	12	
Company B:														
7						1	2	2	1	6		6		18
6	1		1	1	2	6	4	8	6	11	5	7		52
5	1	6	4	2	3	6	7	6	3	1	4			43
4	4	5	4	2	4	4	2	4	2	2				33
3	5		3	4				1	2		1			16
2	2		1		1									4
1														0
Company F:														
7						1		1		1	1	2		6
6					1	1	1	2	2	3	1	2		13
5	1				1		2	2	1	1	5	1		14
4		2	2	3	5	7	6	8	5	1	2	2		43
3	3	2	1	2	2	1	3	3	2	2				21
2		1	1	1										3
1	1													1
Company I:														
7						1	1			3				5
6					1	1		5	3	4	6	3		23
5	3	1	1	3		2	3	7	3	6	2	1	2	34
4	2	2	2	3	4	2	5	6	7	7	2	2		44
3				2										2
2														0
1														0
Company H:														
7						1		1		2	2	1	1	8
6			1			1	1	1	2	5	2	7	2	22
5			2	1	5	5	2	4	7	4	5	2		37
4	4	2	4	5	8	9	14	6	6	2	3			66
3	3	1	1	2	4	2	2	1	2					18
2	2	1	1		1			1						6
1	2						1							3
Company K:														
7								2	1		1			4
6			1			1		3	4	3		4		16
5	1	2		2	1	6	1	5	3	0	2	3	2	28
4	7	5	3	5	3	1	7	8	4	6	3	2	1	55
3	4	1	2	2	4	2	1	3	1	2	1			23
2	2	1	2		1	1			1					8
1		2	1							1*				3
Total	48	34	38	43	51	62	65	90	68	72	48	45	8	672

TABLE 103.—*Correlation of intelligence ratings with score.*

Rating.	Alpha test 2.																					Total.
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Company B:																						
7		1							1	2		2	3	1	2	2	2	1			1	18
6	1	2			1	1	3	6	6	6	6	8	1	3	3	1	2	2				52
5	3		1	2	2	5	10	3	4	3	3	2	3	2								43
4	5	1	5	3	6	2	2	2	3	2	2											33
3	4		1	1	2		5	2		1												16
2	3					1																4
1																						0
Company F:																						
7							1	2		1	1			1								6
6						1		1	2	3	1	1	1		1		2					13
5					1	1	1	1	3	4		1		1				1				14
4		4	1	3	4	5	4	9	3	4	4	1					1					43
3	1	3	3	2	1	2	1	2	4	1		1										21
2		2				1																3
1							1															1
Company I:																						
7										2		2					1					5
6					1	1	1	1	1	6	3	4	2	2	1							23
5	4		1	1	1	4	2	4	3	7	2	2	2	1								34
4	2	5	1	3	3	2	7	1	4	2	3	9	1								1	44
3					2																	2
2																						0
1																						0
Company H:																						
7									2		1	1	1	1		1		1				8
6	1						4	1	4	2	4	1					1	2		1	1	22
5		1	1	1	2	3	1	2	5	4	5	5	2	1	1	1	1	1				37
4	8	2	6	2	3	12	4	12	9	2	3	1		2								66
3	2	2	1	1	2	4	1	2	1			1		1								18
2	3	1			1			1														6
1	1		1		1																	3
Company K:																						
7								1		2	1											4
6	1					1	1	2	2	1	1		4	1	1	1						16
5	2	1			2	2	3	3	3	3	4		1	2		2						28
4	9	2	3	4	2	3	4	5	5	4	6	2	2	1		1	1	1				55
3	1	2	2	1	5	4	2	1	1			3		1								23
2	4	1					1		1	1												8
1			1	1			1															3
Total	55	30	28	25	42	55	60	64	67	63	50	47	23	21	9	10	10	9		1	3	672

TABLE 104.—*Correlation of intelligence ratings with score.*

Rating.	Alpha test 3.																	Total.
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Company B:																		
7							1	3	4		3		2	1	5	2		18
6	3	2	1	6	4	1	2	7	5	2	5		4	1	1	5	1	52
5	7	1	4	6	5	1	2	5	4	3	1	2		1		1		43
4	8	5	3	6	1	1	3	5	1	5								33
3	8	1	1	4	1								1					16
2	2	2																4
1																		0
Company F:																		
7							1		1	1				2			1	6
6			1			1	1	1			1		5	2	1			13
5	1			1	1	1	2	2		2	2	1				1		14
4	4	2	3	7	3	2	8	1	4	4		1	4					43
3	2	1	4	3	1	4	3	2								1		21
2		2	1															3
1	1																	1
Company I:																		
7						1			1	2	1							5
6	1			1		1	3	5	3	3	3	3						23
5	5	2	2	1	3	3	4	8	3	2				1				34
4	12	3	1	5	3	3	4	3	3	3	1	2					1	44
3			1	1														2
2																		0
1																		0
Company H:																		
7								1	3	1		2				1		8
6	1			1	1		2	1	2	4	1	3		3	1	1	1	22
5	5	2	2	2		3	5	3	2	4	3	2		2	1		1	37
4	14	3	8	4	6	8	8	4	3	5	1	1	1					66
3	8	3	2		1		2	1	1									18
2	3	1		1		1												6
1	1		1						1									3
Company K:																		
7							1			1	1	1						4
6			1			2	3		4			2	2		1	1		16
5	3		1	3	2	1	5	3	1	3	1		2	1	2			28
4	13	1	4	5	2	5	4	4	5	3	5	2		1		1		55
3	10	3	1	3				1	4					1				23
2	4			1		1		2										8
1	2				1													3
Total	118	34	42	61	35	40	66	60	55	45	29	22	21	16	9	14	5	672

TABLE 105.—*Correlation of intelligence ratings with score.*

Rating.	Alpha test 4.																					Total.
	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	
Company B:																						
7				1	1	1				1	4	3	2	3					1		1	18
6	7	3	3	6	2	5	3	1	4	2	8	3	2	1	1					1		52
5	14	6	1	3	4	5	4	3		1	1	1										43
4	14	9	1	3	2		1	2	1													33
3	9	2	2	2	1																	16
2	3	1																				4
1																						0
Company F:																						
7						1						2	1		1			1				6
6		1			1		1	1	3	1	1			3					1			13
5	4		1		1	1	3	2	1						1							14
4	17	3	2	2	3	5	5	1	1	1	1		1		1							43
3	8	6	2		1	1				2	1											21
2	2	1																				3
1	1																					1
Company I:																						
7						1		2	1		1											5
6	2			2	2	3	2	1	4	1	2	1	2	1								23
5	13		2	4	5	2	2	2		2												34
4	16	4	5	3	4	4	1		2	1	2		1						1			44
3	1	1																				2
2																						0
1																						0
Company H:																						
7			1						1	1	2			1	1			1				8
6	2	1	2	1			2	5	1	2				4		1				1		22
5	9	2	3	3			6	3	1		2	2	1	3	1		1					37
4	32	4	6	3	4	3	4	3	3	1	1	1				1						66
3	11	2	1	1		1		2														18
2	5						1															6
1	1	1		1																		3
Company K:																						
7				1		1				1	1											4
6	1		1	1	1	2	1		1	1		2		1	1	2					1	16
5	4	4	2	1	2		3		2		1	3	1	3			2					28
4	23	6	1	1	7	2	2	3	2	3	2	2					1					55
3	17	1		1	1		1		1			1										23
2	5	1			1			1														8
1	1	2																				3
Total	222	61	36	40	43	38	44	32	29	21	30	21	11	20	7	4	4	2	3	2	2	672

TABLE 106.—*Correlation of intelligence ratings with score.*

Rating.	Alpha test 5.																								Total.
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Company B:																										
7										1		1	3	1	1		1		1	3	2	1	2		1	18
6	2	1	1		1		2	4	4	3		3	4	4	4	6	2	1	1	1	3		1		3	52
5	1	4	1	2	4		2	4	3	5	4	2	2	3		2			2		2					43
4	5	5		3	3	4	1	3	1	1	2			2			1		1	1						33
3	6	1	2	1	1	1			1		1			1					1							16
2	4																									4
1																										
Company F:																										
7					1						1						1	2				1				6
6	1								1		1		2	2	1	1				2		1				13
5				1		1	1	2		1		1	1	1	1		1	2			1					14
4	9	1	1	2	4	2	2		1	6	4	2	2	3	2				1	1						43
3	5		1	1	3	1	2				3	1		1	1	1			1							21
2	3																									3
1	1																									1
Company I:																										
7													1	2				2								5
6	2	1	1				1	1	3	1			1	3	2	1	2	2		2						23
5	10				1	2	1		4	2	3	4	3	3		1										34
4	8	2	2	2	2	6	2	4	2	4		2	1	3			2	1								44
3			1	1																						2
2																										
1																										
Company H:																										
7						1			1				2				1	1					2			8
6	2		2		1	2	1			1	1		3	1	1	3	2			1			1			22
5	7	1	2		2		3		1	4	1	2	2	1	2	2	1	2	3	1						37
4	16	4	7	9	4	2	2	4	5	2	4	1		1		2		2		1						66
3	5	1	1		2		5	1		2	1															18
2	3	1	1						1																	6
1	1							2																		3
Company K:																										
7 c.											1						2			1						4
6	1				1			2		1	1		1			3	1			3			1		1	16
5	3		1	1	1			1	1		5	4		3	1	2	1	1	1				1		1	28
4	13	4	2	2	2	3	5	1	4	1	4			3	4	2	3		1			1				55
3	9	3	1		1		1		1	1	1	2	1	1		1									1	23
2	5					1			1								1									8
1	2				1																					3
Total	124	29	27	25	35	26	31	29	35	36	38	25	29	39	20	27	23	16	14	17	8	4	8		7	672

TABLE 107.—*Correlation of intelligence ratings with score.*

Rating.	Alpha test 6.																					Total.
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Company B:																						
7	1							1	1		3	5	2	3	1				1			18
6	4	4	1	1	1	2	4	4	2	4	6	7	6	2	1	1	2					52
5	8	3	4	1	4	3	5	3	3	5	2	1	1									43
4	12	3	4	2	1	1	1	3	2	2	2											33
3	7	3		1			2	1		2												16
2	3		1																			4
1																						0
Company F:																						
7								2			2	1		1								6
6		1		1	2	2			1	1		4		1								13
5	2		1		1	2	1		2	1	1	1	2									14
4	8	3	2	5	3	6	2	2	7	1	3				1							43
3	10	2		2	2	1	1	2		1												21
2	3																					3
1	1																					1
Company I:																						
7											2		1		1							5
6	1				1		3	2	3	6	2	1	1	2	1							23
5	6	2		2	1		2	3	5	3	5	2	2			1						34
4	8	2	4	3	1	1	4	5	4	5	4	2								1		44
3				1			1															2
2																						0
1																						0
Company H:																						
7				1					1	1		1			1	3						8
6	1				1	1		3	5	4	1	1	2			1		1		1		22
5	5	3		4	1		1	3	4	4		3	4	2	3							37
4	18	4	4	2	4	11	4	4	3	6	1	3	1	1								66
3	4	3	1	1		3	2	1	2	1												18
2	4		1			1																6
1	2					1																3
Company K:																						
7						1	1						1	1								4
6	1			1		1	2	1	2	1	2	3	1		1							16
5	3		2	2			2	1	4	1	5	4	2	1	1							28
4	16	5	1	4	1	5	4	3	3	6	5	2										55
3	10	2	1	2		1	1	2	1		3											23
2	4		1		1				1	1												8
1	3																					3
Total	145	40	28	36	25	43	43	46	56	58	47	43	25	15	10	6	2	1	1	2		672

TABLE 108.—*Correlation of intelligence ratings with score.*

Rating.	Alpha test 7.																				Total.
	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	
Company B:																					
7		1	1		1	2	1	2	1	2	3				1		2		1		18
6	12	2	3	7	2	3	3	3	1	2	6		1	3	2		1		1		52
5	17	5	5	7	1	1		2	2	3											43
4	17	4	3	4	3		1	1													33
3	11	1	1	1	1		1														16
2	4																				4
1																					0
Company F:																					
7				2									3		1						6
6	2	2		2	1	1	1	1				1			1				1		13
5	2		1	1	3	1	1	1		1	1			1		1					14
4	21	4	6	3	3	2	1	2	1												43
3	10	1	6	2		1				1											21
2	3																				3
1	1																				1
Company I:																					
7				1			1	1		2											5
6	2		1	3	4	1	3	1		1	4	2			1						23
5	7	3	4	4	2	4	3	1		2	3	1									34
4	15	6	4	8	3	2	2		1			1		1						1	44
3	2																				2
2																					0
1																					0
Company H:																					
7				2		1			1				2		2						8
6	3	2	2	2	2		2	1		1	1		1	1		1	2			1	22
5	11	6	1	1	5		4	4				1	2	1		1					37
4	28	14	10	6	5	2			1												66
3	10	5	1	1		1															18
2	5		1																		6
1	3																				3
Company K:																					
7		1		1	1		1														4
6	1	1	2	2	1	1	2		1		1						2	2			16
5	7	3	1	1	3	1	4	1		1	2	1	2						1		28
4	20	5	6	4	3	4	4	3	1	4	1										55
3	14	1	1	3	2					1		1									23
2	4	1	1			1	1														8
1	3																				3
Total	235	68	61	68	46	29	36	24	10	21	22	8	11	7	8	3	7	2	4	2	672

TABLE 109.—*Correlation of intelligence ratings with score.*

Rating.	Alpha test 8.																				Total.
	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	
Company B:																					
7									1	1	1		2	4	2	1	3	1	1	1	18
6	2	2	2	3	2	4	6	2	3	1	3		2	2	6	3	2	3	3	1	52
5	7	1	6	3	2	5	3	2	3	3	1	1	2	2	1		1				43
4	7	5	6	5	1	1	1	2	3		2										33
3	8	3		1	1	2							1								16
2	3			1																	4
1																					0
Company F:																					
7												1		1	2			1	1		6
6							3						3		2	1	2	1		1	13
5	1		1		1	1	1		2	2	1	2	1		1						14
4	6	4	4	1	7	5	5	2	3	2	2	1							1		43
3	7	3	3	3	2	1		1										1			21
2	2	1																			3
1			1																		1
Company I:																					
7								1				1		1	1			1			5
6	1				1	1	1	1	3	2	3	1	4		2	2		1			23
5	6	1	2	3	3	2	3	3	4		2	2	2								34
4	12	3	2	2	3	3	6	1	3	3	2		1	1			1		1		44
3	1	1																			2
2																					0
1																					0
Company H:																					
7						1		1			1			3			1	1			8
6	1	1			1	1	1		1	2	2		1	7	2			1	1		22
5	3		4	3	3	3	3	2		1	2	1	2	4	3	1	2				37
4	15	6	7	11	5	4	2	1	4	3	2	1	4		1						66
3	7	3	2	1	1	1			1			1	1								18
2	5									1											6
1	2	1																			3
Company K:																					
7							1								1	1			1		4
6					3				1		3		1			1	2	4		1	16
5	3		3	1	2	2	1	1	4	1		1	1	3		3	1			1	28
4	13	4	3	2	5	5	6	2	3	5		1	1	1	1	1	1		1		55
3	11	3	1			1	1	3	1				2								23
2	4	1	1	1								1									8
1	1	2																			3
Total	128	45	48	41	43	43	44	25	40	27	27	15	31	29	25	14	17	15	10	5	672

TABLE 110.—*Correlation of intelligence ratings with score.*

Rating.	Alpha raw total.																					Total.
	0	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200	
Company B:																						
7								1	1	1	2	3	2	3	1	1		1	2			18
6	1		2	3	5	7	5	3		2	6	2	5	4	4		2			1		52
5	4	3	2	6	4	8	6	3		2	1	1	3									43
4	5	7	6	4	3	2	1	3	1		1											33
3	5	6		2	1			1		1												16
2	3		1																			4
1																						0
Company F:																						
7								1		1			1	1		1	1					6
6					1		1	1	1	1	2	2	1			1	1					13
5		1			2	2	1		3	1	2		1			1						14
4	2	4	9	3	4	6	5	5	1	2		1		1								43
3	3	2	6	4	2		1		2			1										21
2	3																					3
1		1																				1
Company I:																						
7									1	1	1	1		1								5
6		1	1					3	5	5	2	1	4		1							23
5	4	4		2		6	3	5	4	4	1		1									34
4	7	4	3	2	8	3	4	3	4	1	1	3									1	44
3		1	1																			2
2																						0
1																						0
Company H:																						
7							1		1		1	1	1	1			1	1				8
6	1			1	3			3	2	2	1	2	2		2		1	1		1		22
5	1	2	5	4	2	3	1	3	1	2	1	6	3		1	2						37
4	8	11	7	12	6	6	7		5	1	1	1		1								66
3	2	5	5	1	2	1	1			1												18
2	4	1					1															6
1	1	1		1																		3
Company K:																						
7								1		1	1	1										4
6				1	1	1	1	1	1	1	2		3			2		2				16
5	2	1	1	3	2	3		5	2		1	2	2	3	1				1			28
4	11	5	6	2	4	3	6	2	5	4	3		3		1							55
3	5	7	3		2	1			2	3												23
2	3	1	2			1				1												8
1		3																				3
Total	75	71	60	50	52	53	45	44	42	38	30	29	32	15	11	8	6	5	3	2	1	672

TABLE 111.—*Correlation of intelligence ratings with score.*

Rating.	Beta test 1.						Total.
	0	1	2	3	4	5	
Company B:							
7		1	1	2	9	5	18
6	1	1		9	24	17	52
5	2	1	2	12	17	9	43
4		1	4	9	15	4	33
3	1	1	3	3	7	1	16
2				2	2		4
1							0
Company K:							
7		1	1	1	2	3	8
6			1	2	7	12	22
5		2		4	15	16	37
4		3	7	21	24	11	66
3			2	5	8	3	18
2	1			3	1	1	6
1			1		1	1	3
Company K:							
7			1	1	1		3
6				1	4	5	10
5			2	4	5	4	15
4	1	1	3	9	12	10	35
3	1	2	1	5	2	5	16
2	1		3	2	2		8
1			1	1	1		3
Total	7	14	33	96	159	107	416

TABLE 112.—*Correlation of intelligence ratings with score.*

Rating.	Beta test 2.																	Total.
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Company B:																		
7							1		1	2		3	2	1	3	4	1	18
6		1	1				1	1	2	1	3	7	7	8	11	6	3	52
5	1		2		1	1	3	4	5	1	5	7	6	1	3	1	2	43
4		2	1	1		1	4	2	1	6	5	1	2	2	2	1	2	33
3	1	1			2		4			1	1	1		2	3			16
2					1				1	1	1							4
1																		0
Company H:																		
7							1				1	1		3	1		1	8
6			1				1	1		1	3	3	2		7		3	22
5		1	1			1			3	5	3	2	6	8	2	3	2	37
4	1	4	6	3	4	2	5	3	5	1	9	3	8	8	2	2		66
3	1	1	2	1		2	1	4	2	1			2			1		18
2		1		1	2				1					1				6
1							2			1								3
Company K:																		
7									2								1	3
6						2	1		1		2		1	2		1		10
5								2	1	1	2	2	3	2	1		1	15
4	4	2	2		1	1		1	2	3	2	4	4	5	2	2		35
3	2	4	3			2			1	1	1			1		1		16
2	1	2		1	2			1			1							8
1						1				2								3
Total	11	19	19	7	13	13	24	19	28	28	39	34	43	44	37	22	16	416

TABLE 113.—*Correlation of intelligence ratings with score.*

Rating.	Beta test 3.													Total.
	0	1	2	3	4	5	6	7	8	9	10	11	12	
Company B:														
7					1	1		1	1		2	5	7	18
6	2	3	1	1		1		4	5	4	6	8	17	52
5	1	2	2	4	1	6	1	3		8	7	4	4	43
4	1	1	3	1	5	2	4	1	4	2	3	2	1	33
3	2	1	2		3		2				2	3	1	16
2	1		1	1				1						4
1														0
Company H:														
7			1							3	1	3		8
6					1	1	2	1	2	2	2	4	7	22
5	2	1		1	1	1	2		7	3	4	12	3	37
4	2	3	8	7	4	1	3	7	4	5	10	2	2	66
3	3		2	1	2	1		3	2	1	3			18
2		1	1	1	1		1		1					6
1		2	1											3
Company K:														
7			1								1	1		3
6									2	1	3	3		10
5	1				1	1	1	1	1	2	1	1	5	15
4	2	3	2	1			2	3	6	4	2	5	5	35
3		1	1	1	1	5	1	2	2	1		1		16
2	2	2	1				2					1		8
1	1	1					1							3
Total	20	21	27	22	21	28	22	27	37	36	45	55	55	416

TABLE 114.—*Correlation of intelligence ratings with score.*

Ratings.	Beta test 4.																Total.
	0	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	
Company B:																	
7							3	1	2	1	1	4	4			2	18
6	1	1			2	3	4	6	3	4	6	3	5		1	13	52
5	1		4	3	2	4	4	5	6	4	4	2	1	1	2		43
4	4	2	3	1	3	9	4	4	1	1			1				33
3	4	1	3	1		1	2	2	1		1						16
2	2				2												4
1																	0
Company H:																	
7									1	1	2	2		2			8
6				1	2	1	1		3	2	6	2	1		1	2	22
5	1	1		1	2	3	4	4	6	3	8	3	1				37
4	9	3	4		10	9	6	10	4	3	4	3	1				66
3	3	1	2		1	3	6		2								18
2	2	1		1			1			1							6
1	1		2														3
Company K:																	
7							1			1					1		3
6								2	1	1	1	1		2	1	1	10
5		1	1		2	1		1	1	1	3	1	1	1		1	15
4	5	1		1	2	4	3	6	4	1	5	2			1		35
3	2	1			2	5		1	2		2	1					16
2	4	1	1	1				1									8
1	1		1				1										3
Total	40	14	21	10	30	43	40	43	37	24	43	24	15	6	7	19	416

TABLE 115.—*Correlation of intelligence ratings with score.*

Rating.	Beta test 5.																										Total.
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Company B:																											
7																		2	2	1	3	2	2	3	2	1	18
6												1	2	3	5	5	4	6	1	5	5		3	4	4	4	52
5	1						2	3	1		3	3	2	3	3	5	2	4	3	5	1	1		3	1		43
4	5				1	3	1	1	1			1	3	3	2	1	4	3	1	1	1						33
3	3	1		2		2	1			2					1			1	1	1			1				16
2	1								1	1				1													4
1																											0
Company H:																											
7													1		1	1	1	1			1			2			8
6	1		1					1	1	1			1		2	2	3	1	2	2					3	1	22
5	2				1			1	2	1		2	2	1	3	4	1	4	3	2	1	3	1	2	1		37
4	8	2		1	1	3		1	5	3	3	6	6	2	3	5	3	2	3	2	2	3			1	1	66
3	3				1			2	2		3	1		1	1	1	1	2									18
2	2										1			1	1			1									6
1	1			1								1															3
Company K:																											
7														1		1					1						3
6					1									1	1				1	1		1	2	2			10
5	1									1	2					1	1	1	2	1		1	1		2	1	15
4	5	1	1		1	2				1	1	1	1	6		2		6	3	1		1		2			35
3	2							1	1	2		2		2	3			2	1								16
2	3	2							1	1	1																8
1	1				1									1													3
Total	39	6	2	4	7	10	2	9	17	15	11	17	17	25	27	29	17	37	25	22	15	13	10	18	14	8	416

TABLE 116.—*Correlation of intelligence ratings with score.*

Rating.	Beta test 6.																					Total.
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Company B:																						
7											1				3	2	2	2	1		7	18
6				1				1	2	1	1	2	5	4	5	5	4	4	8	4	5	52
5				1					3	4	3	1	3	8	2	5	2	5	3	3		43
4		1	1			1	1	1	3	5	5		4	2	3	1	3	2				33
3	1			1			2	1	1	1		3		1		1	1	1	1	1		16
2					1						2					1						4
1																						
Company H:																						
7															2	1	2	2		1		8
6												3		1		5	2	5	3	2	1	22
5						1	1	2	1	1			2	3	2	4	5	2	2	8	3	37
4	1			2	1		3	1	8	6	4	2	10	5	2	7	9	1	3	1		66
3	2					1	3		1		3		1		1	2	1	2			1	18
2	1						1	1		2					1							6
1	1									1	1											3
Company K:																						
7													1					1		1		3
6												1					2		1	3	3	10
5					1				1				2	3	1	1		4		1	1	15
4	1		2	1	1		2	1	1	2	4	1	2	3	4		2	3		4	1	35
3		1		1	1			1	1	1	1	2	1	1	1	1			1	2		16
2			1	1	1			1	1			2	1									8
1				1		1												1				3
Total	7	2	4	9	6	4	13	10	23	24	25	17	32	31	27	36	36	34	23	31	22	416

TABLE 117.—*Correlation of intelligence ratings with score.*

Rating.	Beta test 7.											Total.
	0	1	2	3	4	5	6	7	8	9	10	
Company B:												
7					2	2	1	2	3	1	7	18
6	1	2	2	4	2	4	7	7	3	8	12	52
5	3	1	2	4	4	6	5	8	3	3	4	43
4	5	2		1	6	6	4	2	2	1	4	33
3	3	2	2	2	2	1	1		2	1		16
2		2			1						1	4
1												
Company H:												
7				1				2	2	2	1	8
6		2				1	0	3	2	4	4	22
5	3		1		2	6	3	7	4	5	6	37
4	11	6	5	8	5	8	6	4	6	3	4	66
3	2	2	1	1	5	2	1	2	1	1		18
2	2	1	1	1			1					6
1	1		1	1								3
Company K:												
7		1		1							1	3
6					2	1			4	1	2	10
5	1	1	1		1			3	1	4	3	15
4	4	1	3		9		3	4	4	6	1	35
3		5		6		3	1				1	16
2	3	1		1	1		1	1				8
1	1			2								3
Total	40	29	19	33	42	40	40	45	37	40	51	416

TABLE 118.—*Correlation of intelligence ratings with score.*

Rating.	Beta raw total.																								Total.
	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	
Company B:																									
7													1		1		3	1	3	2	5	1		1	18
6						1		1		1	1	1	1	3	7	2	4	5	7	5	5	3	4	1	52
5			1		1			1	4	1	2	3	4	2	2	4	5	8	4	1					43
4					2	2	2	2	2	4	4	1	2	3	4	3		1			1				33
3				3	2	1	2	1					1	1	1	1	1	1		1					16
2				1				1		1		1													4
1																									
Company H:																									
7																	4	1	2	1					8
6									1	1	1				1	5	3	3	1	3	1		1	1	22
5				1	1			2			2	1		2	3	8	2	5	3	6		1			37
4		1		1	3	4	5	1	5	5	6	7	6	6	3	3	5	1	3		1				66
3	1	1			1	1		1	1	2	3		4		1	2									18
2		1		1				2					2												6
1				1		1			1																3
Company K:																									
7											1						1				1				3
6													1	1			1	3			2	1	1		10
5						1		1			1		2				3	2	2	1	1		1		15
4		2	3		2			2		1	1	1	2	5	4	1	2	2	6		1				35
3					1	3	1	1	1	1	1	2	1	1	1		1	1							16
2		2		2		1		1	1				1												8
1				1	1								1												3
Total	1	7	4	11	14	15	10	17	16	17	23	17	29	24	28	29	35	34	31	20	18	6	7	3	416

SECTION 2.—*Examination "a" and intelligence ratings.*

The data secured from examination of the groups described in table 80, p. 426, as alpha before *a*, and *a* before alpha has been utilized in an attempt to discover what effect, if any, the revision of the early examination *a* into the later alpha had upon the efficiency of the examination as in instrument for the measurement of intelligence.

Tables 119 and 120 give the results as far as total weighted scores (tests weighted as during the examination in the first four army cantonments) are concerned, for *a* as a first and as a second examination, the other examination given at the same sitting being alpha. Tables 84 and 121 give the results of the alpha examination of these same groups. It is immediately obvious that the correlation of scores in both examinations, as either first or second examinations, with ratings, are so nearly the same that there has been no very great change either for better or for worse in the revision. To discover more exactly the effect of dropping tests 2 (memory span for digits) and 10 (number comparison) table 122 was formed. The resulting correlation coefficient is very slightly lower than for all 10 tests. Although unweighted scores have been used in table 122 the result is almost exactly comparable with the result of table 119, owing to the very high, practically perfect correlation between weighted and unweighted scores. But the slight decrease in correlation when tests 2 and 10 are omitted may be entirely due to the increase in zero scores—i. e., in the number of unmeasured cases, and may therefore not indicate the loss of any qualitively essential or important feature of the examination.

TABLE 119.—*Correlation of examination "a" scores with officers' ratings—"a" before alpha (Camp Meade).*

Officers' ratings.	Examination *a* weighted scores.																		Total.
	0–19	20–29	40–	60–	80–	100–	120–	140–	160–	180–	200–	220–	240–	260–	280–	300–	320–	340–	
7						1				2		1	2	1	1		1		9
6				1	1	1	1		1	2	1	2	1			2	1	1	15
5	2	3	3	2	7	1	4	4	2	5	4	4	3	3	3	2	2	1	55
4	9	9	8	11	10	16	9	8	6	6	2	6	2	2					104
3	7	4	7	5	10	1	2	1	1		4								42
2	4	3				1													8
1	2	1																	3
Total	24	20	18	19	28	21	16	13	10	15	11	13	8	6	4	4	4	2	236

$r = 0.546.$

TABLE 120.—*Correlation of examination "a" scores with officers' ratings—"a" after alpha (Camp Meade).*

Officers' ratings.	Examination *a* weighted scores.																				Total.
	0–19	20–29	40–	60–	80–	100–	120–	140–	160–	180–	200–	220–	240–	260–	280–	300–	320–	340–	360–	380–	
7											1	1	3	2	3	1		1			12
6				1		1	1	2	2	6	3	7	7	6	3	1		2			42
5	1	3	1	2	4	2	5	6	4	8	9	8	4		4		1				62
4	3	3	7	12	11	9	11	8	11	12	5	7	5	1	2					1	108
3	2	1	2	4	7	5	2	3		2	1		1								30
2	1	1	1																		1
1			1																		3
Total	7	8	12	19	22	17	19	19	17	28	19	23	20	9	12	2	1	3		1	258

r=0.568.

TABLE 121.—*Correlation of alpha scores with officers' ratings—"a" before alpha (Camp Meade).*

Officers' ratings.	Alpha raw scores.																			Total.
	0–9	10–19	20–	30–	40–	50–	60–	70–	80–	90–	100–	110–	120–	130–	140–	150–	160–	170–	180–	
7												1	2			2	1	1		7
6					1	1	2		1			4	2				1	1	2	15
5	3	4	3	3	2	5	6	1	1	4	3	5	1	5	4	2		2	1	55
4	10	10	11	13	11	12	11	7	3	3	2	2	5	1	1	2				104
3	11	5	9	5	2	2	2		2	1		2		1						42
2	4	2	1			1														8
1	2	1																		3
Total	30	22	24	21	16	21	21	8	7	8	5	14	10	7	5	6	2	4	3	234

r=0.562.

TABLE 122.—*Correlation of examination "a" raw total, omitting tests 2 and 10, with officers' ratings—"a" before alpha.*

Officers' ratings.	Examination *a* raw scores.																		Total.
	0–9	10–19	20–	30–	40–	50–	60–	70–	80–	90–	100–	110–	120–	130–	140–	150–	160–	170–	
7					1			1	1		2	2	1	1					9
6			2	1		1		1	2	2	2				1	2		1	15
5	5	2	5	5	4	4	2	4	4	3	5	2	1	4	2	2		1	55
4	16	11	17	10	13	9	7	4	5	3	6	1	1	1					104
3	12	5	11	5	1	3		1	3			1							42
2	6	1		1															8
1	3																		3
Total	42	19	35	22	19	17	9	11	15	8	15	6	3	6	3	4		2	234

r=0.530.

TABLE 123.—*Zero order correlations of examination "a" tests and officers' ratings of intelligence.*

Officers' Ratings.	Test.									
	1	2	3	4	5	6	7	8	9	10
	0.4801	0.4147	0.4520	0.4771	0.5198	0.4326	0.4839	0.4091	0.4443	0.4396
1		.5639	.6234	.7398	.7402	.6858	.6668	.6109	.6401	.6709
2			.5520	.6103	.5986	.5238	.5560	.5323	.5177	.5742
3				.6793	.6909	.7084	.5572	.6110	.6770	.5644
4					.8141	.7529	.7472	.6977	.7036	.6968
5						.8216	.8345	.6748	.7258	.7198
6							.7369	.6960	.7501	.6052
7								.6276	.6491	.6651
8									.6642	.6106
9										.5654

TABLE 124.—*Ninth order correlations of examination "a" tests with officers' ratings of intelligence.*

$r_{R1.2345678910}$= 0.0980± .0435	$r_{R6.1234578910}$= −0.0876±0.0435
$r_{R2.1345678910}$= .0735± .0436	$r_{R7.1234568910}$= .0809± .0435
$r_{R3.1245678910}$= .1056± .0434	$r_{R8.1234567910}$= .0122± .0439
$r_{R4.1235678910}$= −.0043± .0439	$r_{R9.1234567810}$= .0524± .0437
$r_{R5.1234678910}$= .0958± .0435	$r_{R10.123456789}$= .0216± .0439

The complete partial correlation of each *a* test with officers' ratings has been carried out. The results are of little use as far as the purpose for which such work is usually done is concerned. Inspection of the ninth order coefficients presented in table 124 shows that (1) none of them is large enough compared with its probable error to be clearly significant; (2) at least two are totally absurd results and can only be taken as invalidating the whole final result. The negative partial coefficients of tests 4 (arithmetic) and 6 (synonym-antonym) mean, if accepted, that to get the best total score the appropriately weighted scores in these two tests must be *subtracted* from the weighted sum of the others. It is true, of course, that the partial coefficient for test 4 is numerically so small that its negative sign is unimportant, but the coefficient for test 6 is numerically one of the largest of the whole series, and had the same result been obtained from 1,000 cases instead of 236, its mathematical significance would have been practically as great as that of any of the other partial coefficients. This result can mean one or both of two things—(1) that the "intelligence ratings" upon which these results are based are not qualitatively acceptable as intelligence ratings; (2) that the zero order coefficeints obtained from the original data are erroneous measures of the intercorrelations of tests, and of the correlations of tests with ratings. That (2) is very probably, at least partially, explanatory of the results of table 124 is apparent when we take into consideration the fact that none of the zero order coefficients was corrected for length of range of test. It is impossible to guess what effect such correction would have upon the value of the partial correlations of the ninth order, but it is clear that the omission of corrections that effect very considerable changes in the values of some of the zero order coefficients makes any computations based upon them wholly unreliable.

It may also be pointed out that the 236 cases upon which these results are based were not all members of the same company, and were consequently not rated by the same officer, nor even ranked with respect to each other. That this fact adds one more item of unreliability to the case against our results is clear in the light of the results of the study of the alpha tests.

The total maximum correlation as determined from the partial coefficients, between the sum, with best weights, of the score in all 10 tests of examination *a* with intelligence ratings by our particular group of officers is 0.5644. The coefficient was 0.546 with the old weighting (not based on partial correlation) and with tests 2 and 10 omitted and all others weighted equally 0.530. That no great gain over unweighted scores by any system of weighting would result was to be expceted in view of tthe very high intercorrelations, but the actual gain is scarcely even significant for the sample.

The net result is therefore a negative one. The futility of attempting to estimate the relative values of tests, and their corresponding weights in a composite score when all intercorrelations are high is clear. Further, the results strongly suggest, if they do not prove, the fallaciousness of a partial correlation system based upon zero order coefficients that are not reduced to a common basis of comparability by correction for the limitations of range of measurement of the different methods of measurement they represent.

The foregoing discussion of the relation of subjective ratings to test performance has not been given without appreciation of one important respect in which such ratings may have a great advantage over intelligence ratings based on psychological tests. The psychological test admittedly measures only what might be termed *instantaneous* intellectual capacity, whereas what we want to predict is *mean effective* intellectual capacity, which is the resultant of *instantaneous* capacity and all of the instinctive and emotional factors which constitute the motivation of the individual. It is not at all improbable that a very high degree of accuracy has already been attained in the measurement of instantaneous intelligence, but only in a competent observer's estimate of intelligence based upon a considerable period of observation are the factors of motivation taken into account. Herein lies a reason why most correlations between ratings and test performance are between 0.50 and 0.60 instead of between 0.90 and 1.

CHAPTER 12.

PERFORMANCE IN INTELLIGENCE EXAMINATIONS AS RELATED TO MILITARY EFFICIENCY.

SECTION 1.—*Examination alpha.*

The amount of weight that should be placed upon intelligence ratings, as determined by psychological examination, in the selection of men for military duty, depends upon the degree to which examination ratings are prognostic of military value. The present chapter discusses the relation of performance in examinations alpha and beta to military efficiency, as such efficiency is estimated by company commanders.

The data come from four camps—Kearny, Travis, Meade, and Custer. The following descriptions of the material from these sources show that differences in the methods of obtaining data must be taken into account in the final summary of results.

(*a*) In Camp Kearny company commanders of certain organizations were asked to select approximately equal numbers of men from each of three classes defined as follows:

(1) The most successful enlisted men of the organization, preferably noncommissioned officers; (2) men of average ability in the work of the command, neither exceptionally good nor exceptionally poor; (3) the least successful men in the work of the command, of definitely less than average ability, but also clearly not *utter* failures; men just "getting by."

The individual cards of the men thus selected in the One hundred and fifty-eighth Infantry only have been used. There were 85 cases in class 1; 68 cases in class 2; and 50 cases in class 3. As a matter of fact all of the men in class (1) who were defined to be "preferably noncommissioned officers" were either corporals or sergeants. Only one corporal was placed in class (2).

(*b*) In Camp Travis the company and battery commanders in the Nineteenth Infantry and Fifty-second, Fifty-third, and Fifty-fourth Field Artillery were asked by the Psychological Examining Board to designate the 10 poorest privates and the 10 best privates in their respective units. These men were examined according to the regular procedure with the result that many of the "poorest" privates were given examination beta, and in some cases were recalled for individual examination. The individual examinations, however, were not sufficiently numerous to justify inclusion in this investigation. There are 885 noncommissioned officers included, 400 cases of "best" privates, and 240 cases of "poorest" privates.

(*c*) At Camp Meade the Seventeenth Infantry was examined by means of alpha and beta in the usual way, and the distribution of letter grades for this regiment was determined. Before the results of the psychological examination were reported, company commanders were asked to rate their men. The following is the form of request for a group of 75 men:

We ask you to grade them according to their military efficiency, which means *practical soldier value* to the Army, all things considered. In estimating military efficiency keep in mind such points as judgment, discipline, comradeship, and initiative. Give your best man the grade of 1; give the 10 next best men the grade of 2; give your three poorest men the grade of 5; give the second poorest group, composed of 11 men, the grade of 4; give all the others (50 men) the grade of 3.

The definite numbers of men to be placed in each class were obtained by prorating the numbers of men actually found from psychological examination in each of the letter grade groups (treating C+, C, and C− as one group).

(*d*) The data from Camp Custer consist of 48 alpha records and 78 beta records of miscellaneous individuals reported by company commanders as of "low military value."

(*e*) In addition to these specially selected groups the alpha and beta records of 984 unselected recruits have been used as a standard group for purposes of comparison.

TABLE 125.—*Means and standard deviations of the mean for scores in the eight alpha tests made by various military groups.*

Tests.	1	2	3	4	5	6	7	8
A. 984 "UNSELECTED" CASES.								
Means	5.58	7.65	6.24	8.93	7.48	6.07	7.83	13.76
S. D. M	.097	.128	.126	.281	.196	.136	.251	.317
B. 304 NONCOMMISSIONED OFFICERS OF THE FIFTY-SECOND, FIFTY-THIRD, AND FIFTY-FOURTH FIELD ARTILLERY, CAMP TRAVIS.								
Means	7.61	10.40	8.55	14.62	10.53	8.78	12.86	18.79
S. D. M	.148	.194	.203	.562	.361	.232	.588	.537
C. 581 NONCOMMISSIONED OFFICERS OF THE NINETEENTH INFANTRY, CAMP TRAVIS.								
Means	6.45	8.73	7.57	11.03	8.47	7.20	9.99	16.34
S. D. M	.114	.139	.146	.358	.252	.161	.344	.356
D. 247 CASES AMONG "10 BEST" PRIVATES IN EACH COMPANY OF THE FIFTY-SECOND, FIFTY-THIRD, AND FIFTY-FOURTH FIELD ARTILLERY, CAMP TRAVIS.								
Means	7.22	9.50	8.39	12.78	9.70	8.04	11.13	17.33
S. D. M	.170	.204	.214	.583	.405	.241	.593	.575
E. 153 CASES AMONG "10 BEST" IN EACH COMPANY, NINETEENTH INFANTRY, CAMP TRAVIS.								
Means	6.70	8.94	8.08	12.60	9.51	7.81	11.74	17.07
S. D. M	.235	.306	.306	819	.457	.307	.812	.769
F. 165 CASES AMONG "10 POOREST" PRIVATES IN EACH COMPANY, FIELD ARTILLERY, CAMP TRAVIS.								
Means	4.98	7.03	5.66	7.19	5.78	5.11	5.15	10.37
S. D. M	.21	.27	.29	.60	.43	.30	.54	.64
G. 75 CASES AMONG "10 POOREST" PRIVATES IN EACH COMPANY OF THE NINETEENTH INFANTRY, CAMP TRAVIS.								
Means	3.54	5.07	3.82	5.41	5.59	4.12	4.54	8.13
S. D. M	.29	.41	.41	1.00	.70	.41	.60	.81
H. 85 CASES IN "SUPERIOR" GROUPS, INFANTRY, CAMP KEARNY.								
Means	7.96	10.48	8.15	15.51	11.21	8.65	17.68	18.02
S. D. M	.253	.290	.254	.922	.628	.459	1.035	.822
I. 68 CASES IN "AVERAGE" GROUPS, INFANTRY, CAMP KEARNY.								
Means	6.26	9.12	7.16	10.87	9.87	7.15	11.01	13.04
S. D. M	.349	.364	.391	1.046	.747	.445	1.074	.910
J. 50 CASES IN "INFERIOR" GROUPS, INFANTRY, CAMP KEARNY.								
Means	5.08	7.54	5.22	6.04	6.40	4.78	7.48	9.40
S. D. M	.413	.453	.360	.836	.855	.486	.993	.897
K. 48 CASES OF "LOW MILITARY VALUE," CAMP CUSTER.								
Means	4.04	6.10	3.71	5.5	5.54	3.60	4.31	9.33
S. D. M	.405	.481	.518	.979	.699	.501	.973	1.26

The material differs so much on account of the methods of obtaining it, as indicated above, that no one method is applicable to all of it.

A customary method of comparing groups of individuals makes use of the ratio of the difference between their means to the probable error of that difference. Such ratios have been calculated for all of the Travis, Kearny, and Custer material (table 127). Different values of

this ratio for different tests in any one comparison of the two groups may be taken to indicate roughly the relative values of the tests for differentiation between the two groups. This method has certain limitations, however, which become very acute when studying tests which are so difficult that a large proportion of those tested fail to make any score. In such a case calculation of the mean and the standard deviation of the distribution mathematically implies a situation that psychologically is far from the truth, because zero, mathematically, is one unit less than one, while a score of zero for a test may mean one arbitrary unit of ability less than that represented by a score of 1, or it may mean any number of such units. The comparison of two tests by this method where one test covers a much greater range of ability than any other is at best very unsafe.

A second method which avoids this difficulty to a considerable extent is an application of Pearson's criterion [1] for significance of difference between two distributions. This method makes no assumption regarding the type of distribution under consideration. It takes into account the undistributed zero cases in a much more adequate manner than the first method described above. The only assumption made by this process of comparing distributions is that the deviations of the proportional frequency in any class interval, due to random sampling, from the true proportional frequency in the sampled population, form a normal or Guassian distribution.

In applying this method we calculate a quantity, χ^2, from the formula

$$\chi^2 = MN.S\left\{\frac{\left(\frac{m}{M} - \frac{n}{N}\right)^2}{m + n}\right\}$$

where M and N are the total numbers of cases in the distributions and m and n are frequencies in corresponding class intervals.

The quantity χ^2 thus obtained may be used in two ways: (1) By means of the formula—

$$C_2 = \left[\frac{\chi^2}{M + N + \chi^2}\right]^{\frac{1}{2}}$$

a coefficient of mean square contingency might be obtained. This would be rather unsatisfactory for the reason that the proper class-index corrections could not be made even approximately. (2) A measure of the probability that the observed divergence would be equaled or excelled in two samples of the same size drawn from a single population, may be obtained from Elderton's tables.[2] This is, in principle, the procedure followed.

Before applying the χ^2 test for divergence all score distributions for all groups have been reclassified as indicated by the following table:

ALPHA TESTS.

Class interval.	1	2	3	4	5	6	7	8
First	0–1	0–4	0	0–1	0	0	0–1	0–1
Second	2–3	2–4	1–3	2–9	1–4	1–3	2–9	2–9
Third	4–5	5–7	4–6	10–17	5–9	4–6	10–17	10–17
Fourth	6–7	8–10	7–9	18–25	10–14	7–10	18–25	18–25
Fifth	8–9	11–13	10–12	26–33	15–19	11–14	26–33	26–33
Sixth	10–11	14–20	13–16	34–40	20–24	15–18	34–40	34–40

BETA TESTS.

Class interval.	1	2	3	4	5	6	7
First	0–1	0–1	0–2	0	0	0–3	0–1
Second	2–3	2–4	3–4	1–6	1–5	4–7	2–3
Third	4–5	5–7	5–6	7–12	6–10	8–11	4–5
Fourth	6–7	8–10	7–8	13–18	11–15	12–14	6–7
Fifth	8–9	11–13	9–10	19–24	16–20	15–17	8–9
Sixth	10	14–16	11–12	25–30	21–25	18–20	10

[1] Biometrika, vol. 8, p. 250ff.; vol. 10, p. 85ff.

[2] W. P. Elderton, Biometrika, vol. 1, pp. 155–163.

In this classification two things have been sought: (1) Smoothness of the resulting frequencies, so that the values of χ^2 may be as free as possible from irregularities in frequencies that have no significance for the diagnostic values of the tests; (2) frequencies in all classes as large as possible relative to the total for the distribution in order that the fundamental assumption of the χ^2 test may be satisfied.

The following table, abbreviated and modified from Elderton, shows the approximate odds against obtaining the corresponding values of χ^2 by chance alone:

χ^2	Odds.
5	1.4 to 1
10	12.3 to 1
15	96 to 1
20	868 to 1
25	7193 to 1
30	69665 to 1

It will be seen that the odds corresponding to a value of 15 are about 68 times those corresponding to a value of 5. This ratio increases as larger and larger pairs of values are taken. Interpolation in Elderton's tables gives a value of $\chi^2 = 4.351$ for exactly even chances. Thus 4.351 is the median value of χ^2 for pairs of samples drawn from the same population, and differing, therefore, only in so far as purely chance factors have been operative, differences which are just as often greater than the median value as less. Interpolation of the values of χ^2 corresponding to odds of three to one (the upper quartile or probable error) and one to three (the lower quartile or probable error), under the same circumstances, gives 2.600 and 6.623, respectively. The differences between each of these values and the value for even chances, 4.351, may thus be taken to indicate approximate magnitudes of the probable error of χ^2 on either side of its median, provided we assume that we may apply to pairs of samples from different populations this criterion which has been developed for samples from the same population. A further complication ensues when we compare two or more modes of measurement of the same two samples, for the values are correlated if the variables measured are correlated. Now the correlation of the fluctuations of sampling of the means of two sets of measuremants is the same as the correlation of the variables measured.

Suppose, then, we are comparing two samples—one, say, of the "poorest" infantry group with another, say, of the standard group. We get a given value of χ^2 for the difference between the distributions of alpha, test 1, for the two samples, and we get another value of χ^2 for the corresponding difference in the case of alpha, test 2. But alpha, test 1, is correlated with alpha, test 2. Hence, if we take a second sample for one group (say, the "poorest" infantry) and compare it in the same manner with the original sample for the other group (the standard) we may expect, in this second comparison, that a chance increase (or decrease) in the value of χ^2 for alpha, test 1, will be accompanied by an increase (or decrease) for alpha, test 2. If alpha, test 1, and alpha, test 2, were perfectly correlated, any changes in the difference between these two groups would necessarily be reflected equally by both tests, and the tendency of both tests to increase (or decrease) together would affect inversely the size of the difference between the samples—i. e., the difference would depend on the degree of correlation. According, then, as we take different samples of population we tend to change the values of χ^2 for different tests together in the same direction and approximately in the same amount. It follows that the differences between two values of χ^2, altering under these conditions, would tend to remain constant. In other words, the difference between two values of χ^2 for different measurements of the same pair of samples is not subject to much greater variability than is a single value of χ^2, provided the correlation between the variables measured is high. This last condition is filled in the case of the alpha tests and for most of the beta tests.

We have seen that the probable error of χ^2 may be taken approximately as 2 ($6.623 - 4.351 = 2.272$ and $4.351 - 2.600 = 1.751$, the distribution of χ^2 is skewed). It seems reasonable, therefore, to assume that, in the comparison of two groups, pairs of values χ^2 differing by 10

or more indicate an operation, in addition to the purely chance variations of sampling in choosing the groups, of selective factors that are correlated to some extent with the type of selection achieved in the alpha and beta tests. We said above that if two tests were highly correlated then a change in the difference between two sample groups would not tend to produce a change in the difference of χ^2. We are now reversing the argument. If in two cases we get very large differences in χ^2 (say, greater than 10) we conclude that the great size of this difference indicates that a variation from one sample to the other is not merely a chance variation, but includes an actual difference in capacities specifically measured by the tests and not common to both (i. e., those capacities not tending to produce correlation).

Each "best private," "poorest private," and noncommissioned officer group in the Camp Travis Infantry and Artillery regiments, as well as the "superior" and "inferior" groups from Camp Kearny, has been compared with the standard group, and several intercomparisons of these groups have been made (Table 127).

The Camp Meade data are not of such a kind that the use of the product-moment method of correlation is justifiable, but two different biserial correlation coefficients have been calculated as follows: (1) By treating the combined "military value" classes a and b (the two highest classes) as the subgroup of the total sample, and (2) by treating similarly "military value" classes d and e (the two lowest classes) as the subgroup. These two sets of coefficients are indicated in Table 126 by the symbols ab/cde and abc/de, respectively. The correlation ratios of score on military value, $_{mv}\eta_{sc}$, and military value on score, $_{sc}\eta_{mv}$, are also given in this table. Finally, correlation with military value of total score on various combinations of four alpha tests have been calculated, as indicated also in Table 126.

TABLE 126.—*Comparison of alpha tests.*

[Coefficients of relationship between performance in each test and in certain combinations of four tests and officers' estimates of military value. Camp Meade experiment. The biserial coefficients of correlation are calculated with the two highest officers' ratings, a and b, as a subgroup (column headed ab/cde), and also with the two lowest ratings, d and e, as a subgroup (column headed abc/de). The correlation ratios are given for test score on military value, $_{mv}\eta_{sc}$ and for military value on test score, $_{sc}\eta_{mv}$.]

Test.	Biserial r.		Correlation ratios.	
	ab/cde.	abc/de.	$_{mv}\eta_{sc}$.	$_{sc}\eta_{mv}$.
1	0.1604	0.0494	0.1237	0.1342
2	.0977	.1587	.1835	.1557
3	.1532	.1504	.1890	.1772
4	.1386	.2043	.1689	.1983
5	.1393	.1783	.1859	.1894
6	.0412	.1402	.1540	.1285
7	.1517	.0460	.1014	.1440
8	.2273	.1502	.1770	.2213
S (1, 2, 3, and 4)	.1486	.1877	.1773	.1737
S (1, 3, 4, and 8)	.1680	.1750	.1696	.2530
S (2, 3, 6, and 7)	.1350	.1388	.1567	.1438
S (2, 3, 4, and 6)	.1040	.0956	.2000	.2064
S (2, 3, 6, and 8)	.1522	.1706	.1891	.1486

TABLE 127.—*Comparison of alpha tests.*

[Degree in which the pairs of groups (at left of table) are differentiated by performance in every test. The first row of figures for every pair of groups gives the difference between the means of the performances of the two groups in every test. The second row gives the ratio of this difference to the standard deviation of the difference. The third row (figures in parentheses) gives the rank order of every test with respect to its effectiveness in differentiation as measured by this ratio. Data are from Camps Custer, Kearny, and Travis.]

Tests.	1	2	3	4	5	6	7	8
"Standard group" *v.* "Men of low military value" (Custer)	1.53	1.55	2.53	3.43	1.34	2.16	3.52	4.43
	3.7	3.1	4.7	3.1	6.6	1.7	3.5	3.4
	(4)	(8)	(2.5)	(6.5)	(1)	(7.5)	(5)	(6.5)
"Standard" *v.* "poorest" Infantry	2.01	2.59	3.58	3.52	1.89	1.95	3.29	5.64
	6.6	6.1	8.3	3.4	2.6	4.5	5.0	6.5
	(2)	(1)	(1)	(7)	(8)	(6)	(5)	(3)
"Standard" *v.* "poorest" Field Artillery	.60	.62	.58	1.71	1.70	.96	2.68	3.39
	1.5	2.0	1.8	2.6	3.6	3.1	4.5	4.7
	(6)	(7)	(8)	(5)	(3)	(4)	(2)	(1)
"Poorest" Field Artillery *v.* "poorest" Infantry	1.41	1.96	1.84	1.78	.18	.59	.61	2.24
	4.0	4.0	3.7	1.5	.22	1.9	.76	2.2
	(1.5)	(1.5)	(3)	(6)	(8)	(5)	(7)	(1)
Noncommissioned officers, Infantry *v.* "poorest" Infantry	2.91	3.66	3.75	5.62	2.88	3.08	5.15	8.21
	9.2	8.6	8.6	5.3	3.9	7.0	7.9	9.3
	(2)	(3.5)	(3.5)	(7)	(8)	(6)	(5)	(1)

TABLE 127.—*Comparison of alpha tests*—Continued.

Tests.	1	2	3	4	5	6	7	8
Noncommissioned officers, Infantry *v.* "Standard"	0.87 5.8 (2)	1.09 5.7 (3)	1.33 6.9 (1)	2.10 4.6 (7)	0.99 3.1 (8)	1.13 5.4 (4.5)	2.19 5.1 (6)	2.57 5.4 (4.5)
"Best" Infantry *v.* "poorest" Infantry	3.16 8.4 (1)	3.87 7.6 (4)	4.26 8.3 (2)	7.19 5.6 (7)	3.92 4.7 (8)	3.69 7.2 (5)	7.20 7.1 (6)	8.94 7.8 (3)
"Best" Infantry *v.* "Standard"	1.12 4.4 (4)	1.29 3.9 (8)	1.84 5.6 (1)	3.67 4.2 (5)	2.03 4.1 (6)	1.74 5.2 (2)	3.91 4.6 (3)	3.31 4.0 (7)
"Best" Infantry *v.* Noncommissioned officers, Infantry	.25 1.0 (7)	.21 .6 (8)	.51 1.5 (6)	1.57 1.8 (4.5)	1.04 2.0 (2)	.61 1.8 (4.5)	1.75 2.0 (2)	1.73 2.0 (2)
"Best" Field Artillery *v.* "poorest" Field Artillery	2.24 7.8 (2)	2.46 7.2 (6)	2.73 7.6 (4)	5.59 6.8 (7)	3.91 6.6 (8)	2.94 7.7 (3)	5.98 7.5 (5)	6.96 8.1 (1)
"Best" Field Artillery *v.* "Standard"	1.65 8.4 (2)	1.84 7.6 (3)	2.15 8.6 (1)	3.85 5.9 (5)	2.22 4.9 (8)	1.97 7.1 (4)	3.30 5.1 (7)	3.57 5.4 (6)
"Best" Field Artillery *v.* "best" Infantry	.52 1.8 (1)	5.6 1.5 (2)	.31 .8 (3)	.18 .2 8	.19 .3 (6.5)	.23 .6 (4.5)	—.61 .6 (4.5)	.26 .3 (6.5)
Noncommissioned officers, Field Artillery *v.* "best" Field Artillery.	.39 1.4 (6.5)	.91 2.7 (1)	.16 .4 (8)	1.84 2.2 (2.5)	.83 1.4 (6.5)	.73 1.9 (4)	1.72 2.2 (2.5)	1.46 1.7 (5)
Noncommissioned officers, Field Artillery *v.* "poorest" Field Artillery.	2.63 10.1 (1.5)	3.37 10.1 (1.5)	2.89 8.2 (8)	7.43 9.1 (6)	4.74 8.4 (7)	3.67 9.7 (4.5)	7.71 9.7 (4.5)	8.42 10.0 (3)
Noncommissioned officers, Field Artillery *v.* "Standard"	2.03 11.5 (2)	2.75 11.8 (1)	2.31 9.6 (4)	5.69 9.1 (5)	3.05 7.4 (8)	2.71 10.0 (3)	5.03 7.9 (7)	5.03 8.1 (6)
Noncommissioned officers, Field Artillery *v.* noncommissioned officers, Infantry.	1.16 6.2 (2)	1.67 9.0 (1)	.97 3.9 (7)	3.59 5.4 (4)	2.06 4.7 (5)	1.57 5.6 (3)	2.86 4.2 (6)	2.45 3.8 (8)
"Superior" *v.* "inferior" (Kearny)	2.88 5.9 (5)	2.94 5.5 (7)	2.93 6.94 (4)	9.47 7.6 (1)	4.81 4.5 (8)	3.87 5.8 (6)	10.20 7.1 (2.5)	8.62 7.1 (2.5)
"Superior" (Kearny, Infantry) *v.* "Standard"	2.38 8.8 (3)	2.82 8.9 (2)	1.91 6.7 (5)	6.58 6.8 (4)	3.72 5.7 (6)	2.58 5.4 (7)	9.85 9.2 (1)	4.25 4.8 (8)
"Standard" *v.* "inferior" (Kearny, Infantry)	.50 1.2 (5.5)	.11 .3 (7.5)	1.02 2.7 (3)	2.89 3.3 (2)	1.08 1.2 (5.5)	1.29 2.6 (4)	3.49 .3 (7.5)	4.36 4.6 (1)

TABLE 128.—*Comparison of alpha tests.*

[Degree in which pairs of groups (at left of table) are differentiated by performance in every test (cf. preceding table). Degree of differentiation is measured by the χ^2 test (see text) and figures in table are values of χ^2. The figures in parentheses give the rank order of every test with respect to its effectiveness in differentiation as measured by the χ^2 test. Data are from Camps Custer, Kearny and Travis.]

	1	2	3	4	5	6	7	8
"Superior" *v.* "inferior" (Kearny)	40.75 (2)	27.22 (7)	29.14 (6)	35.82 (3)	25.67 (8)	30.53 (5)	46.85 (1)	32.28 (4)
"Superior" *v.* "average" (Kearny)	17.33 (3)	8.51 (7)	22.06 (1)	16.84 (4)	14.07 (8)	14.79 (5)	20.02 (2)	13.83 (6)
"Standard" *v.* "10 poorest" (Infantry, Travis)	29.64 (2)	36.90 (1)	28.33 (3)	**22.30 (5)	12.38 (8)	13.53 (6)	16.68 (6)	28.02 (4)
"Standard" *v.* "10 poorest" (Field Artillery, Travis)	7.83 (7)	*7.21 (8)	*12.53 (4)	*12.03 (5)	11.40 (6)	15.73 (3)	21.51 (2)	28.22 (1)
"10 poorest," Field Artillery, *v.* "10 poorest," Infantry	10.03 (4)	17.28 (1)	15.39 (3)	17.10 (2)	4.36 (6)	2.66 (8)	3.98 (7)	4.59 (5)
Noncommissioned officers, Infantry *v.* "poorest"	85.38 (3)	103.46 (1)	89.70 (2)	**58.12 (5)	*24.40 (8)	40.13 (6)	46.39 (4)	80.22 (4)
Noncommissioned officers, Infantry *v.* "standard"	43.62 (5)	*48.37 (3)	54.99 (2)	46.36 (4)	*14.58 (8)	40.31 (6)	35.79 (7)	61.92 (1)
"Best," Infantry *v.* "poorest," Infantry	79.19 (1)	51.09 (3)	62.68 (2)	36.12 (7)	29.40 (8)	43.68 (5)	38.35 (6)	48.13 (4)
"Best," Infantry *v.* "standard"	*19.83 (6)	14.60 (8)	25.85 (4)	*26.86 (3)	19.77 (7)	*32.02 (1)	28.57 (2)	*24.93 (5)
"Best," Infantry, *v.* Noncommissioned officers, Infantry	*2.12 (8)	**7.07 (2)	*3.84 (7)	*10.03 (1)	*6.66 (4)	**6.04 (6)	7.02 (3)	**6.52 (5)
"Best," Field Artillery, *v.* "poorest," Field Artillery	58.87 (2)	47.88 (5)	56.28 (3)	37.60 (8)	39.10 (7)	55.19 (4)	41.71 (6)	66.43 (1)
"Best," Field Artillery, *v.* "standard"	62.97 (1)	48.00 (4)	55.73 (2)	51.43 (3)	26.30 (8)	44.26 (6)	32.03 (7)	47.73 (5)
"Best," Field Artillery *v.* "best" Infantry	3.20 (6)	*6.13 (3)	**4.95 (4)	8.33 (2)	2.93 (7.5)	**2.93 (7.5)	**3.29 (5)	*10.75 (1)
Noncommissioned officers, Field Artillery, *v.* "best," Field Artillery	*7.40 (2)	*6.25 (4)	*3.87 (8)	6.66 (3)	6.05 (5)	5.93 (6)	5.78 (7)	**7.59 (1)
Noncommissioned officers, Field Artillery *v.* "poorest," Field Artillery	93.36 (1)	76.12 (4)	72.87 (5)	60.91 (7)	62.03 (6)	80.29 (3)	56.83 (8)	91.44 (2)
Noncommissioned officers, Field Artillery *v.* "standard"	103.98 (1)	85.67 (3)	75.41 (6)	100.39 (2)	54.47 (8)	85.19 (4)	76.40 (5)	65.87 (7)
Noncommissioned officers Field Artillery, *v.* noncommissioned officers, Infantry	37.51 (1)	34.23 (3)	14.89 (8)	36.15 (2)	23.86 (6)	32.20 (4)	**28.88 (5)	18.19 (7)

The results of the treatment of the data from all camps are brought together in Tables 126, 127, and 128.

Table 126 gives the various coefficients of relationship between test performance and military efficiency for the Camp Meade data.

Table 127 presents the results of comparing special groups in other camps by the method of ratios of differences of means to their probable errors. This table gives for every comparison, first, the difference between means; second, the ratio of that difference to its probable error; and, third, in parentheses, the rank of the test concerned with respect to the other seven tests.

Table 128 presents the χ^2 values for the same set of comparisons. The numbers in parentheses are the ranks of the tests for each comparison. Numbers single starred are those derived from distributions which intersect more than once, and are consequently slightly affected by the factors other than those of prime importance for the evaluation of tests. This inaccuracy, however, is practically negligible. Numbers double starred are those which are affected in the same way to a much greater degree. It will be noted, however, that such cases occur usually when the distributions compared are so nearly alike that their differences may be entirely due to chance factors. No use, therefore, will be made of these cases in the interpretation of results.

Figure 1 represents diagrammatically a comparison of the rank orders for tests derived from the methods of analysis. The vertical dotted lines in the chart represent diagrammatically the various groups compared, as designated at the top. Two inset numbers are carried by each double-pointed arrow. The number in the circle is the rank of the test with respect to the others for the comparison of the two groups indicated by the points of the arrow by the χ^2 method of comparison. The number in the square is the corresponding rank for the method of the ratio of the difference to its standard deviation. It will be seen that there is generally close agreement between the two sets of ranks. As already pointed out, however, it seems safer to base conclusions on the χ^2 test.

The outstanding result is a great variation of rank orders from one comparison to another by either method of analysis. These variations in rank order can scarcely all be due to purely chance factors. As a starting point the order of tests by length of effective range has been compared with some of the orders of tests according to their effectiveness in differentiating between two groups. The distributions for each test of the standard group of 984 cases show that some tests clearly have much shorter ranges than others, with the result that large percentages of zero scores occur in some distributions since the limitation of range is at the lower end. This order of tests according to range is given approximately by the middle column of Table 129. Test 2 has probably the longest range and test 7 the shortest. It is reasonable to suppose that tests failing to measure the lower grades of ability will be considerably handicapped by this fact in differentiating between low-grade groups. Those tests having the longest range, other things being equal, may be expected to differentiate most sharply between low-grade groups. Reference to table 129 shows that the pattern of differentiation defined by the comparison "poorest" Infantry v. standard agrees rather closely with the order of tests according to their lengths of range. The chief difference is that the differentiation by tests 4 and 7 is apparently better than was to be expected in view of their short range handicap.

In the case of the next higher group, "poorest," Field Artillery, *v.* standard, tests 1 and 2 rank lowest, and 4, 7, and 8 (especially 7) show a greatly increased sharpness of differentiation. A direct comparison of differentiation patterns for "poorest," Infantry, *v.* standard and "poorest," Field Artillery, *v.* standard (Table 130) indicates that these two differ in the relative positions of 1, 2, 6, 7, and 8, while 4 has the same rank in both. Tests 1 and 2 differentiate most sharply the "poorest" Infantry from standard and least sharply "poorest," Field Artillery, from standard while 6, 7, and 8 play relatively more important rôles in the differentiation pattern for "poorest," Field Artillery, *v.* standard. Next considering the two differentiation patterns "best," Field Artillery, *v.* standard and "best," Infantry, *v.* standard (Table 131), almost a complete reversal is found. Tests 6 and 7 for "best," Infantry, *v.* standard, and with the exception of 5 are the smallest factors for "best," Field Artillery, *v.* standard. On the other hand, tests 1 and 2, though not definitely least important for the "best" Infantry differentiation, are definitely inferior to 6 and 7; and, though not clearly most important in the other comparison, do definitely outweigh the least important ones which include 6 and 7.

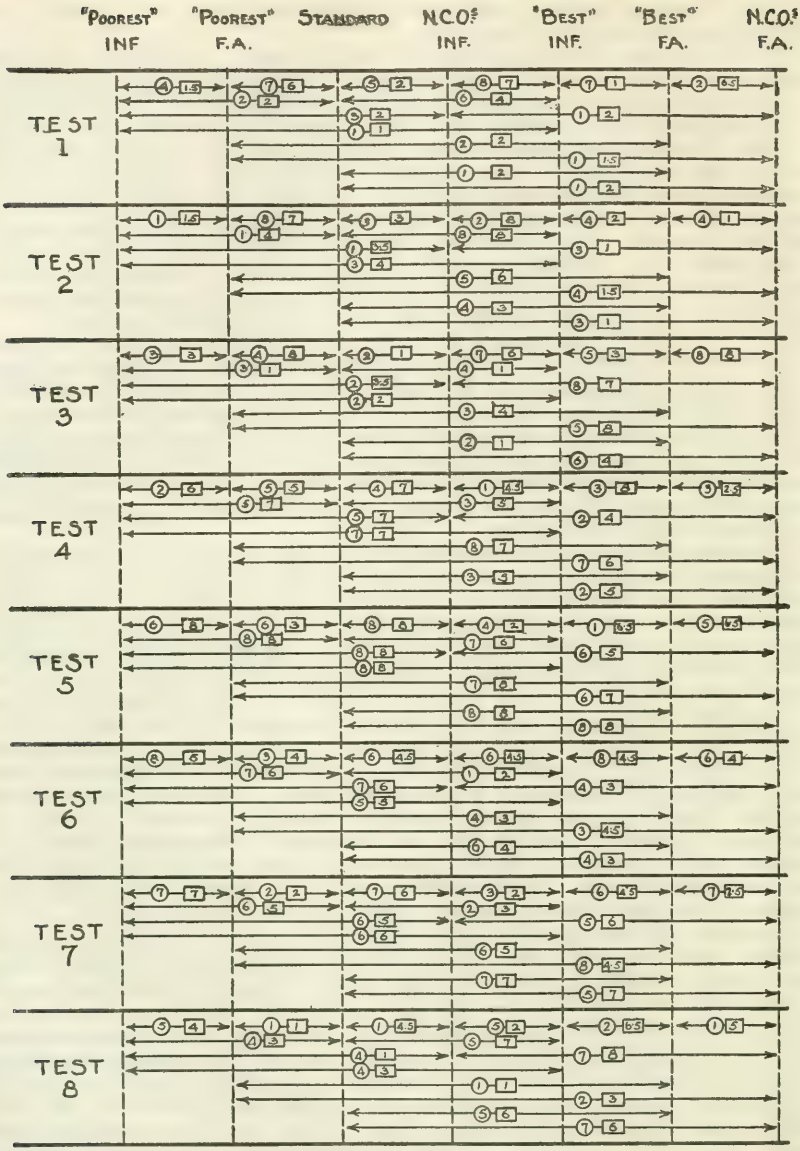


FIG. 1.—Comparison of alpha tests according to rank order of each test in differentiating between certain military groups. The arrowhead shows the particular pair of military groups (named at the top of the diagram) differentiated between by a particular test (listed at the left of the diagram); the number on the arrows give the rank order of the particular test as a differentiator between these two groups. The number in the circle is the rank order based on the χ^2 criterion; the number in the rectangle is the rank order based upon the ratio of the difference to its probable error. See text for discussion of these criteria.

TABLE 129.—*Comparison of alpha tests.*

[The columns of numbers not in parentheses are the numbers of the eight alpha tests arranged in order of their efficiency in differentiating the two military groups named at the head of the column; the test listed at the head of the column is the test that differentiates best. The numbers in parentheses are the numbers of those tests which are so superior or inferior in differentiating capacity to the test beside which they are placed as to give, when compared with that test, a difference in the values of χ^2 of 10 or more. For the significance of differences in values of χ^2 greater than 10 as criteria of reliability, see discussion in the text.]

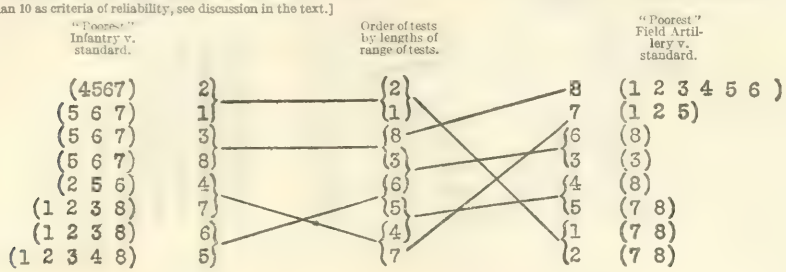


TABLE 130.—*Comparison of alpha tests.*

[See legend to Table 129.]

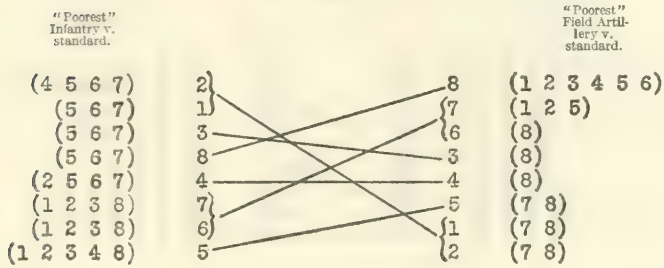


TABLE 131.—*Comparison of alpha tests.*

[See legend to Table 129.]

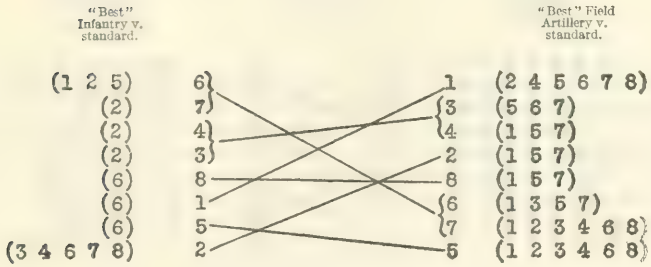


TABLE 132.—*Comparison of alpha tests.*

[See legend to Table 129.]

"Poorest" Infantry v. "best" Infantry.			"Poorest" Field Artillery v. "best" Field Artillery.
(2 3 4 5 6 7 8)	1	8	(2 3 4 5 6 7)
(1 2 4 5 6 7 8)	3	1	(2 4 5 7)
(1 3 4 5 7)	2	3	(4 5 7 8)
(1 3 4 5 7)	8	6	(4 5 7 8)
(1 2 4 5)	6	2	(1 4 5 8)
(1 2 3 8)	7	7	(1 3 6 8)
(1 2 3 8)	4	4	(1 2 3 6 8)
(1 2 3 6 8)	5	5	(1 2 3 6 8)

TABLE 133.—*Comparison of alpha tests.*

[See legend to Table 129.]

Noncommissioned officers, Infantry v. standard.			Noncommissioned officers, Field Artillery v. standard.
(1 2 4 5 6 7)	8	1	(2 3 5 6 7 8)
(1 5 6 7)	3	4	(2 3 5 6 7 8)
(5 7 8)	2	2	(1 3 4 5 8)
(5 7 8)	4	6	(1 3 4 5 8)
(3 5 8)	1	7	(1 4 5 8)
(3 5 8)	6	3	(1 2 4 5 6 8)
(3 4 5 8)	7	8	(1 2 3 4 6 7)
(1 2 3 4 6 7 8)	5	5	(1 2 3 4 6 7 8)

TABLE 134.—*Comparison of alpha tests.*

[See legend to Table 129.]

Noncommissioned officers, Infantry v. "poorest" Infantry.			Noncommissioned officers, Field Artillery v. "poorest" Field Artillery.
(1 3 4 5 6 7 8)	2	1	(2 3 4 5 6 7)
(1 4 5 6 7)	3	8	(2 3 4 5 6 7)
(2 4 5 6 7)	1	6	(4 5 7 8)
(2 4 5 6 7)	8	2	(1 4 5 7 8)
(1 2 3 5 6 7 8)	4	3	(1 4 5 7 8)
(1 2 3 4 5 8)	7	5	(1 2 3 6 8)
(1 2 3 4 5 8)	6	4	(1 2 3 6 8)
(1 2 3 4 6 7 8)	5	7	(1 2 3 6 8)

TABLE 135.—*Comparison of alpha tests.*

See legend to Table 129.

Noncommissioned officers, Infantry, *v.* standard.			"Best" Infantry *v.* standard.
(1 2 4 5 6 7)	8	6	(1 2 5)
(1 5 6 7)	3	7	(2)
(5 7 8)	2	4	(2)
(5 7 8)	4	3	
(3 5 8)	1	8	
(3 5 8)	6	1	(6)
(3 4 5 8)	7	5	(6)
(1 2 3 4 6 7 8)	5	2	(3 4 6 7 8)

TABLE 136.—*Comparison of alpha tests.*

See legend to Table 129.

Noncommissioned officers, Field Artillery, *v.* standard.			"Best" Field Artillery, *v.* standard.
(2 3 5 6 7 8)	1	1	(2 4 5 6 7 8)
(2 3 5 6 7 8)	4	3	(6 5 7)
(1 3 4 5 8)	2	4	(1 5 7)
(1 3 4 5 8)	6	2	(1 5 7)
(1 4 5 8)	7	8	(1 5 7)
(1 2 4 5 6 8)	3	6	(1 3 5 7)
(1 2 3 4 6 7)	8	7	(1 2 3 4 6 8)
(1 2 3 4 6 7 8)	5	5	(1 2 3 4 6 8)

TABLE 137.—*Comparison of alpha tests.*

See legend to Table 129.

Noncommissioned officers, Infantry, *v.* Noncommissioned officers, Field Artillery.

1	(3 5 8)
4	(3 5 8)
2	(3 5 8)
6	(3 8)
7	(3 8)
5	(1 2 4)
8	(1 2 4 6 7)
3	(1 2 4 6 7)

When the differentiation pattern for "poorest," Infantry, *v.* "best," Infantry, is compared with that for "poorest," Field Artillery, *v.* "best," Field Artillery, the two are found to be nearly identical; the only difference that may be stressed is the shift in rank of test 8. The agreement between the order of tests for "poorest," Infantry, *v.* "best," Infantry, and the order of tests as to length of range is again very close; no significant differences are present. In summary, then, we have four rank orders of tests which do not differ significantly from one another, except in one instance. These four cases are:

(*a*) "Poorest," Infantry, *v.* standard: 2, 1, 3, 8, 4, 7, 6, 5.

(*b*) "Poorest," Infantry, *v.* "best," Infantry: 1, 3, 2, 8, 6, 7, 4, 5.

(*c*) "Poorest," Field Artillery, *v.* "best," Field Artillery: 8, 1, 3, 6, 2, 7, 4, 5.

(*d*) Order of tests according to length of range: 2, 1, 8, 3, 6, 5, 4, 7.

The one exception is the displacement of test 8 in (*c*).

As a possible aid to interpretation the fact should be noted that the two "poorest" groups under consideration are both *inferior* to the standard group and the two "best" groups are both *superior* to the standard. The fact, then, that tests 1 and 2 differentiate "poorest" Infantry privates from unselected recruits most sharply means that "poorest" Infantry privates are relatively lower in these two tests than in the other tests of alpha. Conversely, the fact that 1 and 2 differentiate "poorest" Field Artillery privates least sharply from unselected recruits indicates that "poorest," Field Artillery, are relatively higher in these two tests than in the other tests of alpha. Moreover, if a selection of "poorest" Field Artillery privates results in a group differing insignificantly from unselected recruits, as is the case when considered as a group, the conclusion is obvious and necessary that the entire group of Field Artillery is superior to the group of unselected recruits, and is, therefore, a selected group. Hence, we are dealing with a secondary selection[1] when considering these groups of "poorest" and "best" privates. The shift of emphasis from tests 6 and 7 to 1 and to a lesser degree to 2 in passing from "best," Infantry, *v.* standard to "best," Field Artillery, *v.* standard, confirms this interpretation. Further, either the primary selection has produced qualitatively different groups, Infantry and Field Artillery, or the secondary selection, giving the two sets of "best" and "poorest" groups, has been made according to standards of military value varying from Infantry qualitatively to Field Artillery. In the latter case the qualitative difference due to secondary selection follows a primary selection that may be qualitatively the same for Infantry and Field Artillery—i. e., merely quantitative.

The results for test 8 are peculiar. In the differentiations for Infantry of tables 129, 130, 131, and 132 it retains the same rank, but in the Field Artillery it differentiates the "poorest" from the standard and the "best" from the "poorest" most sharply, and the "best" from the standard only to a moderate degree. These facts suggest that the primary selection of the sampled Artillery regiments has resulted in a group not measuring up in test 8 to the standard set in other tests, but that general information, which test 8 tests, has counted heavily in the secondary selections. It would be interesting to know more of the variations in the distribution of scores for test 8 for different parts of the country, since a number of the items of this test are probably much better known in some parts of the country than in others. It may happen, therefore, that the men in the Artillery regiments in Camp Travis have come largely from parts of the country where the information required for scoring high on test 8 is rather unusual.

The patterns of differentiation for the noncommissioned officers of the Infantry and Field Artillery regiments tend to confirm some of our previous conclusions and also to complicate the situation further. We note again the evidence of primary selection of artillerymen of a sort that correlates with test 1. When the differentiation pattern for noncommissioned officers, Field Artillery, *v.* standard is compared with noncommissioned officers, Infantry, *v.* standard, the contrast between these two types of differentiation occurs in the ranks of tests 3 and 8. The inference made above with respect to test 8 that the primary selection in the Artillery was not highly correlated with knowledge of miscellaneous facts, is supported here. When Field Artillery noncommissioned officers are compared with "poorest," Field Artillery, this inference (that general information was an important factor in the secondary selection) is further confirmed. Further evidence of the qualitative differences in the selection types under discussion is given by the consistently high rank of test 3 in all the intra-Infantry comparisons and its medium or low rank in the intra-Artillery comparison.

It is perhaps worthy of notice that tests 3 and 8 differentiate Infantry noncommissioned officers most sharply from the standard group, and Field Artillery noncommissioned officers least sharply (excepting only test 5). Yet paradoxically these tests differentiate least clearly Infantry noncommissioned officers from Artillery noncommissioned officers. This apparently again is evidence of considerable difference in the standards to which men in the two arms of service have had to measure up in order to be granted warrants as noncommissioned officers. The fact that the two groups of noncommissioned officers are most alike as regards tests 3 and 8 is probably not significant of any special relationship between performance in these

[1] The fundamental selection of men by principal groups (Infantry, Artillery, standard group) may be referred to as a primary selection; a selection within one of these groups of the "best" or "poorest" men, say, is then a secondary selection.

tests and ability as noncommissioned officers, but due to a largely fortuitous combination of difference in general levels of ability of these two groups with the qualitative differences between the two groups—a combination in which tests 3 and 8 are the points of contact.

We may summarize our results for the Travis data: (1) Artillery organizations as a whole seem to constitute a moderately highly selected group as compared with the Infantry organizations. Certain phases of value to the service, correlated differently with different alpha tests, have been important factors in the primary selection, or more accurately, elimination. The tests apparently most highly correlated with the primary selection of artillerymen are 1 and 2. (2) The selection with which we are immediately concerned is superimposed upon this basic selection and this fact apparently introduces new factors, especially those factors correlated with tests 6, 7, and 8. (3) In the Infantry there is not much indication of primary selection of a type that can be distinguished from the secondary selection. The diagnostic values of tests in the secondary selection are probably somewhat obscured in the comparison of low-grade groups by the shortness of range of the tests; but tests 1, 2, and 3 apparently correlate most highly with the factors of the secondary selection. (4) Generally speaking tests 1, 2, and 3 appear to show sharper discrimination than other tests. (5) Test 5 almost invariably has the lowest rank.

The hypothesis outlined above is not presented as a definite conclusion established by statistical analysis of the data, but is a frank attempt to fit the large number of rather discordant results into some kind of a system. The attempt has not been very successful, and the one safe conclusion that can be drawn is that *the standards of military value according to which the several groups have been selected are so variable that an attempt to estimate the relative values of the alpha tests must necessarily fail until such variability of standards is adequately controlled.* Since the alpha tests have rather high intercorrelations it is evident that there can be no very great differences in the way in which they differentiate individuals.

The attempt to provide a statistical criterion of reliability has evidently been beside the point since this criterion of reliability takes account only of the individuals in the selected groups *for constant selective factors* and does not give a measure of the variability of the selective agents. As already pointed out, the selective agents have been so few in number that their resultant is subject to a large variability.

If we take into account the results of comparing the three groups from Camp Kearny, we merely add more variation to our results.

The results obtained from the Camp Meade data, which required treatment by methods different from those employed with the Travis and Kearny data, increase the chaos. This case, however, is the only one in which there is a *classification* of the individuals of a complete (though selected) group (if we neglect the classification by alpha and beta examinations). In the other cases we had a *selection of a special subgroup* to the total neglect of all individuals in the other subgroups. It is thus theoretically possible to measure the degree of correlation between the standard of classification and the scores in separate tests or in combinations of them. Practically, however, such work is unsatisfactory, since we have to break up into two parts (alpha-beta segregation) the group that is complete from the point of view of army selection (i. e., of permanent assignment to military units). Treatment of the two fragments separately is bound to lead to very small correlation coefficients. The complete group of 773 cases is divided between the alpha and beta examinations in the proportion of 362 to 411. If we consider the relation of the alpha-beta segregation (Camp Meade never gave both examinations to the same man) and military value we have the following distribution:

Military value rating.	a	b	c	d	e	Total.
Alpha	16	35	243	56	12	362
Beta	5	18	218	117	53	411
Total	21	53	461	173	65	773

We can calculate a biserial correlation ratio and its value proves 0.3426.

It is clearly necessary to define exactly "military efficiency" or "value to the service" before any attempt is made to study correlations of test performance with it. (The alpha tests, although often claimed to be alike, are nevertheless different enough to reflect the qualitative differences of selected groups.) All of the tests show a rather satisfactory degree of differentiation between groups of considerable differences in military efficiency. It is possible that greater refinement in the definition of standards of military efficiency and in the application of them would make possible a better selection of alpha tests than exists at present. So long as such standards remain as vague and undefined as the present study indicates them to be there is little ground for regarding one alpha test as considerably more or considerably less efficient than another, always excepting test 5, which seems consistently from every point of view the least effective.

SECTION 2.—*Examination beta.*

In general the beta tests show the same tendency to vary in sharpness of differentiation in the different groups compared. Data on three groups only have been available and these groups are rather small. There are but 242 cases in all. These facts make it almost impossible to draw any certain conclusion as to the relative values of the tests. Tables 138 to 140 give the comparisons.

Unfortunately the distributions of scores for the "poorest" Field Artillery, group of test 4 could not be used owing to clerical errors in transferring scores to individual record cards.

In the comparison of "poorest" Infantry *v.* "poorest" Field Artillery, test 3 ranks first in sharpness of differentiation, and in the differentiation of "poorest" Field Artillery *v.* standard it is second. In the comparison of "poorest" Infantry *v.* standard and men of "low military value" *v.* standard, it ranks sixth. This is probably the only case of considerable shift in rank for which an explanation can be offered. A study of the distribution of scores of the standard group indicates that test 3 is of the "all-or-none" variety, since its frequency curve is U-shaped. Such a test will give a very clear distinction between two groups which lie on opposite sides of the point in the scale of ability which is crucial for the test.

TABLE 138.—*Means and standard deviations of the mean for scores in the seven beta tests made by various military groups*

Test.	1	2	3	4	5	6	7	8
A. 984 "UNSELECTED" (ENGLISH-SPEAKING) CASES.								
Mean	7.03	9.53	7.38	13.73	13.76	12.42	5.75	7.51
S. D. M	.077	.157	.122	.233	.206	.131	.098	.105
B. 72 CASES AMONG "10 POOREST," PRIVATES, FIELD ARTILERY, CAMP TRAVIS.								
Mean	3.36	7.35	7.25	(1)	12.11	10.06	4.42	.....
S. D. M	.169	.413	.359	.....	.791	.509	.373	.....
C. 92 CASES AMONG "10 POOREST," NINETEENTH INFANTRY, CAMP TRAVIS.								
Mean	2.18	3.78	3.15	8.51	5.55	7.46	1.38	.....
S. D. M	.150	.278	.288	.933	.591	.406	.238	.....
D. 78 CASES OF "LOW MILITARY VALUE," CAMP CUSTER.								
Mean	4.65	4.67	3.94	5.15	6.03	7.03	3.14	3.62
S. D. M	.284	.430	.329	.553	.508	.435	.304	.316

[1] Several cases obviously scored erroneously.

TABLE 139.—*Comparison of beta tests.*

[Coefficients of relationship between performance in each test (as well as in the total examination and in the sum of tests 4, 5, 6, and 7) and officers' estimates of military value. Camp Meade experiment. The biserial coefficients of correlation are calculated with the two highest officers' ratings, *a* and *b*, as a subgroup (column headed *abcde*) and also with the two lowest ratings, *d* and *e*, as a subgroup (column headed *abcde*). The correlation ratios are given for score on military value, $_{mv}\eta_{sc}$, and for military value on score, $_{sc}\eta_{mv}$. The numbers in parentheses show the rank order of correlations.]

	Biserials.		Correlation ratios.	
	$_{ab}r_{bis}$	$_{abcde}r_{bis}$	$_{mv}\eta_{sc}$	$_{sc}\eta_{mv}$
Total raw score	0.4192	0.3185	0.3428	0.3734
Test 1	.1933 (7)	.1931 (5)	.2127 (5)	.2723 (4)
Test 2	.2618 (5)	.2530 (3)	.3019 (3)	.2678 (5)
Test 3	.3035 (3)	.1811 (6)	.2001 (6)	.2413 (7)
Test 4	.3910 (1)	.2910 (2)	.2783 (4)	.3235 (2)
Test 5	.2327 (4)	.2026 (4)	.3184 (1)	.2553 (6)
Test 6	.3810 (2)	.3277 (1)	.3107 (2)	.3782 (1)
Test 7	.2497 (6)	.1495 (7)	.1614 (7)	.2735 (3)
Tests 4, 5, 6, 7 sum	.4299	.3117	.3776	.3190

TABLE 140.—*Comparison of beta tests.*

[Degree in which paired groups are differentiated by performance in every test. The first column for each paired group gives the difference (d) between the means of the performances of the two groups in every test. The second column gives the ratio of this difference to the standard deviation of the difference $\left(\frac{d}{S.D._d}\right)$, which is a measure of the effectiveness of the differentiation between the groups in the pair by the test. The third column (figures in parentheses) gives the rank order of every test with respect to its effectiveness in differentiation. Data are from Camps Custer and Travis.]

	Men of "low military value" *v.* standard group (Camp Custer).		"Poorest" Infantry *v.* standard group (Nineteenth Infantry, Camp Travis).		"Poorest" Field Artillery *v.* standard group (Fifty-second, Fifty-third, Fifty-fourth, Field Artillery, Camp Travis).		"Poorest" Infantry *v.* "poorest," Field Artillery (Camp Travis).	
	d	$\frac{d}{S.D._d}$	d	$\frac{d}{S.D._d}$	d	$\frac{d}{S.D._d}$	d	$\frac{d}{S.D._d}$
Test 1	2.37	8.1 (7)	4.84	28.7 (1)	3.67	19.7 (1)	1.18	5.2 (5)
Test 2	4.87	10.6 (4)	5.75	18.0 (2)	2.19	4.9 (2)	3.56	7.2 (2)
Test 3	3.44	9.8 (5)	4.23	13.5 (4)	.13	.3 (6)	4.10	8.9 (1)
Test 4	8.57	14.3 (1)	5.21	5.4 (7)	.....	.....	.....	.....
Test 5	7.74	14.1 (2)	8.21	13.1 (5)	1.65	2.0 (5)	6.56	6.6 (4)
Test 6	5.39	11.8 (3)	4.96	11.6 (6)	2.36	4.5 (3)	2.60	4.0 (6)
Test 7	2.61	8.2 (6)	4.37	17.0 (3)	1.34	3.5 (4)	3.04	6.8 (3)

TABLE 141.—*Comparison of beta tests.*

[Degree in which paired groups are differentiated by performance in every test (cf. preceding table). Degree of differentiation is measured by the χ^2 criterion (see text) and figures in the table are values of χ^2. The figures in parentheses give the rank order of every test with respect to its effectiveness in differentiation as measured by the χ^2 criterion. Data are from Camps Custer and Travis.]

	Men of "low military value" *v.* standard group (Camp Custer).	"Poorest" Infantry *v.* standard group (Nineteenth Infantry, Camp Travis).	"Poorest" Field Artillery *v.* standard group (Fifty-second, Fifty-third, Fifty-fourth Field Artillery, Camp Travis).	"Poorest" Infantry *v.* "poorest" Field Artillery, (Camp Travis).
Test 1	83.64 (5)	119.54 (4)	5.90 (6)	30.18 (5)
Test 2	92.98 (4)	140.20 (2)	30.47 (1)	42.53 (2)
Test 3	59.63 (6)	90.36 (6)	26.35 (2)	56.79 (1)
Test 4	111.92 (2)	81.63 (7)	.....	.....
Test 5	107.61 (3)	139.99 (3)	11.84 (5)	39.14 (4)
Test 6	128.37 (1)	106.04 (5)	21.77 (3)	20.71 (6)
Test 7	57.74 (7)	172.64 (1)	16.03 (4)	41.11 (3)

This is what probably happens in the case of "poorest" Infantry *v.* "poorest" Field Artillery. We have already seen in the discussion of the alpha tests that the poorest Artillery privates who took alpha were superior to the poorest Infantry privates who took alpha. The corresponding beta cases appear to be differentiated in the same way. The poorest Infantry privates are on the whole a little too dull to comprehend the situation presented by test 3, and

consequently the group makes a very poor showing. The Artillery privates, on the other hand, as a group have enough intelligence to understand the test, and, owing to its all-or-none nature, make very high scores. The result is that the two groups are very sharply differentiated.

The order of tests in differentiating "poorest" Infantry from standard differs from that in the differentiation of "men of low military value" from standard chiefly in the positions of tests 4, 6, and 7. Test 7 ranks last in the latter case and first in the former. Tests 6 and 4 show the same almost complete exchange of positions. There is probably no other explanation than the one given in the case of the alpha test—viz, that the standards of selection of these two groups have been qualitatively different.

The comparison of beta tests on the basis of the Camp Meade data adds another degree of variation to the results. The correlations between military efficiency and score which it has been possible to obtain from these data are generally higher than the corresponding correlations for alpha tests. This, however, does not mean that the beta tests are necessarily better measures of military efficiency than the alpha tests. It is merely an apparent superiority due probably to the fact that a greater proportion of the individuals tested by beta fall within the effective ranges of the tests than is the case with the alpha group. There is not much common ground upon which a comparison of alpha and beta can be made. Both are effective only within special ranges which do not overlap to any great extent.

Correlation ratios for military value on scores indicate that tests 4 and 6 are the best tests of the set. This conclusion agrees with the result of the comparison of "men of low military value" with standard, referred to above, but contradicts the result of the comparison of "poorest" Infantry with the standard.

CHAPTER 13.

CONDITIONS OF EXAMINING AND PROCEDURES ADOPTED DURING THE INITIAL EXPERIMENT.

SECTION 1.—*Character of groups examined.*

The four camps in which psychological examining began in the fall of 1917 were National Army cantonments. The men examined were thus in large measure obtained by the operation of the selective service act. Several small organizations in each of these cantonments were volunteer units. A nucleus of Regular Army troops was also sent to these contonments. Though the selective service act intended and produced a certain form of random selection, it is necessary, nevertheless, to make it clear that the data presented are not based on a random selection from the general population. The large numbers of individuals examined are liable to obscure this important fact.

Other conditions further limit the character of the groups examined. Draft boards kept in deferred classes certain feeble-minded types. The proportion of men of average and superior intelligence volunteering their services to the Regular Army, to officers' training camps, to staff corps, to specialized branches such as gas defense, intelligence, aviation, etc., can not be confidently stated. Still other war activities, together with Navy enlistments, constitute factors that seriously affect the probability of obtaining a general intelligence distribution.

With the exceptions mentioned above, the operation of the selective service act determined the source and nature of the cantonment population. Relatively few women were tested by the use of examination *a*, and none is included in the summaries given. The men tested were practically all of the ages of 21 to 31, inclusive. They came primarily from Class I of the classes produced by the operation of the above act. Class I was composed largely of men whose ages were nearer 21 than 31. The operation of the selective service act placed in this class those men between the ages mentioned who carried less important social and business responsibilities. In the first months of its operation there were called in the draft only those who were physically qualified. There is therefore no guaranty that a social and intellectual cross section of the general population is represented.

Draft calls were based on quotas drawn from certain sections specified for each cantonment. The psychological examinations using examination *a* were given in Camp Devens, Ayer, Mass., Camp Dix, Wrightstown, N. J., Camp Lee, Petersburg, Va., and Camp Zachary Taylor, Louisville, Ky. The communities furnishing men to these camps were located near the several camps. Camp Devens drew recruits from the New England States and northeastern New York; Camp Dix recruited from Delaware, New Jersey, and northern New York; Camp Lee drew from Virginia, West Virginia, and western Pennsylvania; and Camp Taylor troops came from Kentucky, Indiana, and southern Illinois. These areas provided practically all drafted men in the four cantonments during the fall of 1917. (This method of drafting for certain camps from within definite boundaries was not continued in later draft calls.)

Certain special conditions of race and social condition also operate to limit the general nature of the intelligence distribution. Two camps contained an exceptionally large percentage of illiterates and foreign born, one a large percentage of foreign born, and the fourth a large number of illiterates. It is not possible to state in full the weights that should be given to such variables as educational opportunity, race, specialized training, literacy, etc., on the general curve of intelligence. They undoubtedly affect the character of the groups examined in considerable degree.

In giving the data on organizations and units in the summary of results, the reports are limited to the status of the units at the time of examination. Assignments in the early phases of the training period were not permanent, and many of the soldiers were shifted from one

organization to another. The original assignments in the four cantonments examined in the fall of 1917 were made largely according to district and local board quotas. The principle involved planned to keep men from the same locality together. It often produced wide variations in the distributions of intelligence, in percentages of native illiterates and foreign-speaking groups. Certain professional groups, such as medical officers, Regular Army units, the field signal battalions, engineer officers, and the less specialized artillery officers, also produce partly skewed distributions.

In general, therefore, the men examined with examination *a* in the fall of 1917 are a selected group. They probably represent the types in the National Army, but do not give us a final national intelligence distribution. The above considerations limit the general significance of results. They further determined certain modifications and additions made to the original methods during this period.

SECTION 2.—*Conditions within the cantonments.*

Numerous details of camp administration affected the original plan of examining. In the four camps skeleton organizations were formed previous to the arrival of the psychological staffs. Officers attached to them were new. To interrupt the already sufficiently unstable and novel relations by an entirely strange examination called for unusual appreciation of the probable value of such tests on the part of commanding generals and other commanding officers. Few officers objected seriously to the order for such examinations, but the time required for repeated examination of the same men became an important issue in the administration of the tests. It was found practically impossible to hold men for successive trials. The importance of careful preliminary segregation became apparent at once. Various expedients were devised to prevent men from attempting examinations in which they were certain to fail, thus necessitating a second and third examination. For the same reason recalls of men who had failed in some examination were partially abandoned. To increase speed, the size of groups examined by a single examiner was rapidly increased in examination *a* and in the group skill test. In rooms capable of holding comfortably 150 to 200 men, the smaller groups recommended in instructions to examiners proved to present less satisfactory examining conditions than a filled room.

The conditions indicated led some of the camp staffs to defer practically all individual examinations until the completion of the group examination of an organization. Psychiatric work, also new, was organized as a part of the base hospital staff only. Reports on low mental age cases were therefore made through the commanding officer of the hospital and full appropriate action on all men was not possible. Only extremely low-grade men could be discharged and border-line cases were returned to their respective units in the absence of opportunity to assign them to service and labor organizations.

The fall work of examining began, as stated above, with divisional organizations. These were usually incomplete and in one camp second and third calls from the different organizations were necessary to obtain all men for examination. For example, an organization would be examined in October. In December succeeding drafts and transfers had increased the strength of the organization often to double its original size. Practically none of these newly assigned men had been examined. The chief examiner must send requests to have all men not examined report for the examination. The continued confusion thus produced was not conducive to a favorable attitude on the part of officers and men. It led psychological examiners to plan the work so that extra recalls, experiments, and objective checks on method would be reduced to the minimum. Reports of results were necessarily partial; totals of men examined practically never checked; and distributions prepared for special emergencies often overlapped.

Opportunity to install psychological examining differed in the camps. Devens and Lee began work fairly promptly. Dix and Taylor were delayed. Dix was unable to establish regular examining on account of lack of space for group examining and incomplete organization of units within the division. Taylor began examining in November. Incomplete official instructions and unfavorable local conditions operated to delay the work and to make the demonstration

of the value of psychological examining relatively unsatisfactory. After beginning the regular program at Devens, the prospective reduction of available space forced the staff to suspend all recalls and rush group examinations in order to complete the survey of all men in camp. The large percentage of foreign and illiterate at Camp Lee made it necessary to modify the arrangements for segregation and recall; examination *b* was dropped after careful study and group skill reduced to half time. Individual examinations, relatively unimportant since satisfactory action on reports was not obtainable, were delayed until the major portion of the group survey was over.

This division of the report is entitled, "The initial experiment." The period of examining ending December 31, 1917, was characterized by a large number of reports on the organization of routine work, on statistical studies, and on attempts to invent new procedures in testing. The staffs were expected to report as fully as possible on the success of the methods. They were authorized to present all suggestions that concerned changes in procedure. Every encouragement to devise new and more suitable tests was given, and criticisms of examining materials invited. This freedom of action tended to produce considerable variation in treatment of results. A few experiments were suggested by the central office but in the main the different camps experimented and discarded according to local findings.

Differences in interpretation of instructions sent to the four cantonments and in interests of the staffs affected the preliminary procedure. The reaction of the staffs in the face of camp conditions varied with the interests and experience of their individual members. Freedom to suggest and experiment gave rein to much variation that might otherwise have been avoided. In general, many new data were prepared. Many forms of testing were tried out; of these the majority were discarded.

It is due partly to different interests exhibited by the staffs of the four cantonments that the work with examination *a* brought out such a varied series of studies and special investigations. The work at Devens centered on problems of segregation and standardization of individual examinations. Dix did a large amount of careful statistical work on examination *a* and studies correlating the army tests with existing methods of determining mental age. Lee centered attention on intelligence distributions and evidences of military value. The Taylor staff presented several short methods of detecting low mentality and investigated the abilities measured by the group skill test. The specific lines mentioned are suggested as showing the differences in type of results reported. All camps, nevertheless, gave data bearing on the general significance of the army tests. It is due to their energy and perseverance that materials for revision were available when the order for extension of psychological examining was given.

Numerous differences in procedure and interpretation may be traced to the fact that the staffs were uniformly instructed merely in general terms. Many of the examiners called in to administer the tests had had no instruction or previous practice in handling the work. Examination *a* was affected very little by the inexperience of examiners. The directions given for administering the test were detailed and had been carefully standardized in advance. The results of its administration are therefore comparable within the limits permitted by the character of recruits examined and physical conditions surrounding the group at the time of examination.

Section 3.—*Description of procedure in examination.*

The original plan of examinations begun in September, 1917, called for a literacy test to segregate literates and illiterates. The group was divided by this test into those who were presumably able to do themselves justice in examination *a* and those who could not read sufficiently well to indicate intellectual status in a test involving reading ability.

The "literate" group then proceeded to take examination *a*. A certain percentage of this latter group making low scores on examination *a* was then recalled and given examination *b*. This test used a different form of the same blanks used in examination *a*. Tests 1, 2, and 10, (directions, memory span for digits and number comparison) were omitted. The time allowed was approximately doubled. The directions were not read aloud by the examiner.

Those failing to make a satisfactory score on the literacy test were given the group skill test (Stenquist). Men failing in any of the above tests were called back and given individual examinations. The tests provided for this individual examination are given in detail in the first revision of the Examiner's Guide. (See pp. 123, ff.) Stanford-Binet, Point Scale, and Pintner-Paterson materials were not supplied examiners and were not authorized parts of the army intelligence examinations at this time. The original plan also contemplated recalling men of superior ability for individual examination. Time and opportunity to develop this portion of the general method were not offered during 1917.

SECTION 4.—*Segregation of various grades of illiterates.*

The most frequent and insistent objection to psychological examining rested on the interference with training programs. It was readily and early demonstrated by the psychological staffs that the group examining calling one thousand to two thousand men a day interfered very little with this training of troops. It was never successfully shown, however, that the continued recalls necessary to give examination *b*, the group skill test, and individual examinations were so essential that repeated interference with company maneuvers should be permitted. The Devens staff succeeded in recalling one or two groups a week for examination *b* and gave practically all the individual examinations indicated. The other three camps departed widely from the original program of examining. Such changes as were made in the four camps were all planned to reduce the time necessary to report a score for each recruit and to make final recommendation on illiterate and low-grade cases.

Three phases of the segregation problem resulted. The original literacy test that constituted a part of the fall examining program was expected to provide a means for the segregation of literates and nonliterates, and also a literacy grading for all semiliterates and literates. The urgent necessity for rapid handling of groups and avoidance of recalls emphasized the need for a brief segregation test. The probability that many who passed this test still failed to do themselves justice in examination *a* because of limited reading knowledge suggested the advisability of giving a literacy grade along with the score. The third consideration was based on the conviction that men unable to write their own letters, to read the newspapers, or unable to make a score in examination *a* indicating their level of ability because of illiteracy, should be credited only with the score that their combined literacy and intelligence levels produced; that is, the additional literacy rating was not necessary for Army purposes, except in those cases where inability to read English resulted in no score or an extremely low one.

The Devens staff made extensive investigations to establish a more definite literacy grading for all recruits than that afforded by the original test. At the same time they desired to make it so that by rapid inspection proper segregation would also be provided. The Camp Dix staff selected the dictation method primarily to provide for rapid segregation. Lee and Taylor aiming at segregation only, used reading ability as determined by questioning and supplemented this by inspection of attempts made on examination *a*. These three camps, therefore, ceased using the literacy test early in the examining program. No careful check was made during the fall to determine the actual difference in standards as used in the four camps. Approximately fifth to sixth grade literacy was used at Camp Devens. The methods in use at the other camps are indicated below;[1] they probably segregate at about fourth grade literacy.

The task of separating the illiterate and semi-literate from the literate was recognized previous to the fall examining in the Army. It had been shown conclusively that a large percentage of men, especially in National Guard camps, could not do themselves justice in examination *a* on account of inability to read. A literacy test adapted from the Thorndike Reading Scale to be given previous to examination *a* was prepared and sent out as a part of the equipment of each staff. Its origin and a description of the test are given on page 347 of this volume. Instructions to examiners stated that this test, in addition to segregating the two groups, would give a grading on literacy for those making a score on the test. These scores,

[1] See page 473.

including zero literacy, were to be recorded on individual record cards. This information was available for use in reports on individual cases when desired by company commanders. In the following discussion we shall refer only to those alternative methods that were tried and discarded or were used in segregating groups in the fall of 1917.[1]

Two general reasons may be presented that led the four camps to discard this literacy test or to attempt to find substitutes therefor. The necessity for speed and prompt and expeditious handling of groups was the first difficulty encountered that led to the shortening of the preliminary questioning. Extra blanks were needed to give this test, and these had to be collected and scored; in the meantime the men would become restless, and green examiners feared losing control of their groups. No satisfactory scoring or inspection procedure was developed that hastened the manipulation of this test. In the second place, as the test was arranged, it proved difficult to standardize and gave results that seemed ambiguous. The standards set were too high. The test failed to "get over," frequently even in the case of men who made average scores or better on examination *a*. On the other hand, several reports on the use of the literacy test indicated that it apparently operated as a rough intelligence test, thereby tending to remove men of low intelligence whatever their degree of literacy. It did not perform satisfactorily either of the operations intended.

A number of different methods was tried out in the attempt to obtain a satisfactory procedure in the segregation of those who could not do themselves justice in examination *a*. At Camp Lee the examiners first tried the method of picking out only those who could do no more than write their name and age. These men were asked if they read their own letters or wrote letters home themselves; if they did they were sent back and allowed to try examination *a*. During the third test of examination *a* the examiner inspected papers and those who were doing little or nothing were sent to the group skill test. A number of other suggestions was made as to procedure in attempting to solve the segregation problem. These were primarily attempts to find short scoring and inspection methods suitable for detecting men who would make low scores in examination *a*.

Early in November a new literacy test, prepared by Dr. T. L. Kelley, was tried out at Camps Lee, Devens, and Dix. A discussion of this test will be found on page 348 of this part. From this account it is evident that this test showed no advantages over the original literacy test. It was therefore not used after the preliminary trials.

The Devens literacy test and the Dix dictation test are discussed in connection with the account of the segregation procedures in these two camps.

Camp Lee.—The final segregation procedure agreed upon at Camp Lee may be described somewhat as follows: When all the men were seated the examiner said, "All those who do not read and write put down their books and come to the front of the room." Many understood these directions and came immediately; others were pointed out by men who knew them and who knew that they could not write their own letters or read the newspapers. After these men were picked out examination *a* was begun. The examiner and his orderlies selected other men who were unable to fill in the information desired at the top of the examination *a* blank. During the arithmetic test the examiner and orderlies again had opportunity to inspect the papers. Men who were not showing any evidence of ability to handle the simplest items in this test and the preceding ones were sent at once to the group skill test.

The psychological staff at Camp Lee found their segregation problem complicated by the presence of both foreigners and native illiterates in considerable numbers. At Devens the foreigners were the more numerous. Demonstration methods received greater attention at Devens and Dix than at either Lee or Taylor on this account. The findings on the original literacy test correspond, nevertheless, quite closely to those found at Lee.

Camp Taylor.—Camp Taylor reported no systematic trial of the original literacy blanks along the lines originally planned. The instructions issued at the time examining on a large scale began in November were based on the experience of the other camps and are as follows:

[1] See general, chap. 5, Methods of Segregation and Tests of Literacy, pp. 347, ff. of this volume.

Each literary test paper [the blanks of original literary test] will be examined briefly as it is taken from the man who has written it. As an examiner or his assistant picks up a paper he will note whether the heading has been filled out and at least one or two words identified. If no words have been identified on the sheet the man will be questioned briefly.

Any man who has written his name legibly in the proper space on the literacy test, even though he has not identified a single word in the list to be marked, will be held for the group intelligence test if he declares, upon being questioned, that he can read the newspaper and write his own letters to the folks at home.

The man who is unable to read and write will be directed to step to the end of the room and get in line with the others there. As soon as all literacy test papers have been collected, the line of illiterate men will be marched to the mechanical skill tests.

On November 5, 1917, the office of the Surgeon General in a letter to Camp Taylor stated that it was extremely important that staffs develop successful procedure for segregating the literates and nonliterates. The report of Camp Taylor on the 25th of December summarizes their experience. It is quoted in full:

In view of our experience here we recommend that no specific literacy test be used. The time required for passing out the literacy test blanks, giving the instructions, and then gathering the papers up is in itself a great waste in view of the fact that the illiterates who can not take the test are removed practically as certainly by the method we have been using here. We ask, as soon as a group is seated and ready for the test, that all "men who can not read well enough to read an ordinary newspaper or who can not write well enough to write their own letters to their friends" stand up and pass to the rear of the room, in order that they may be taken to "an examination of a little different sort." Mentioning the fact that they are to be taken to another examination keeps those who would try to escape by feigning illiteracy. The great objection to the literary test is the time required to score the papers and then match up the scores with the score in intelligence or skill. The company commanders have shown no interest whatever in the "degree of literacy." It seems to us an absolute waste of time and energy to use any other than our common-sense method of sorting, together with the sorting that results from the intelligence examination itself.

Inspection of the papers during the progress of examination *a* enabled the examiners to send a few others to the examination for illiterates. No special efforts were made to produce a new group literacy test.

Camp Devens.—The original literacy test was used as the main procedure for the segregation of recruits at Camp Devens. That it served materially to reduce the numbers of low-grade men given examination *a* is indicated by the fact that of 18,000 men examined, 264, or only 1.5 per cent, fell below 50 in examination *a*. At the same time it appears that the distinction as made by this test did not closely follow grade differences as reported. Evidence is presented elsewhere (see p. 347) to show that the grade standards assigned to the original literacy test were too severe, due in part at least to the elimination of the preliminary demonstration form. Data obtained at Camp Devens indicated that almost half of the men would be forced to take the group skill test if all men below sixth grade literacy as determined by the literacy test were eliminated from examination *a*. In order to avoid this, the Devens staff planned to be very liberal in scoring literacy and aimed to retain all men who could be expected to do "half respectable" work in examination *a*. Evidence presented indicates that this "liberality" meant in fact approximately fourth to sixth grade literacy, with a fairly wide range of variation.

Camp Devens immediately began to experiment with other methods of segregation than the original literacy test. A suggested alternative to the regular literacy test was to send to the skill test room men whose record of schooling was less than seventh grade and who obtained a score of less than 5 on test 1 in examination *a*. Considerable data were presented to indicate that this method sends to the skill test practically all who would obtain a score of less than 100 in examination *a*. The most important step in the attempt to solve the segregation problem was made at this camp. Several new tests were devised, and one which is described on pages 349 to 354 of this volume was standardized for school children. This test was used to some extent in the actual work of examining at Camp Devens. It was carefully standardized for later use on adults at Devens and Dix.

Another equivalent method was used. A large revolving disk was placed at the entrance to the examining room. On the disk were a number of commands that could be obeyed by simply pointing to large drawings printed on a card near the disk. Each man was expected

to read the directions and to point to the appropriate drawing. This method was not extensively used because it gave segregation merely, and not a literacy gradation. A modification of the original literacy test was also tried. This consisted in the omission of written instructions and the use of blackboard demonstration. No definite results were reported.

Camp Dix.—A carefully summarized statement of the relation between the results of the literacy test and examination *a* on 307 cases was reported by the Camp Dix staff. They conclude that the literacy test does not fairly eliminate those who can not read English from the *a* examination. Certain material facts support this conclusion. Fifty-one per cent of the entire group received grades of 0 or 2 in literacy and would therefore have been eliminated from the *a* examination. Nine per cent of those scoring zero and 46 per cent of those scoring 2 in literacy exceed the median of the entire group in examination *a*.

The staff at Camp Dix concluded after actual experience with the test:

> It is doubtful whether we may expect to develop for immediate use a satisfactory test which will form a basis for distinguishing different degrees of literacy and at the same time be adapted for use in the rapid preliminary division of men for the group test. To meet the first requirement we probably need a longer test; to meet the second, a very brief test. It is believed that the literacy test as given in the Examiner's Guide is unsatisfactory.
>
> Considering the information given in the regular intelligence examinations and that available in the personnel office, one may doubt whether a gradation in literacy, such as that proposed, is worth the effort necessary to obtain it. And, if it is highly desirable to obtain such information, one would think that it might best be obtained by a somewhat more extensive examination in the regular intelligence series.
>
> It is believed that the chief purpose of the preliminary group examination should be that of selecting (1) those who can profitably be examined by group methods which necessitate an elementary knowledge of the English language as printed and written as well as spoken and (2) those who must be examined by group methods requiring little or no knowledge of English and by the individual examination method.

For experimental purposes, Dix modified instructions for giving the literacy test. In one modification the directions were read aloud. In another the printed directions were folded back and the men were instructed orally to draw a line under every word that meant an animal. The result seemed to indicate that the complication in the instructions of the original form prevented the test from measuring the lower degrees of literacy. A third form omitted all reading material except the four lines of test words. A demonstration blackboard with demonstration material similar to the test material was used.

In order to attain the second result desired—namely, the discovery of a brief test which will segregate those unable to do themselves justice in examination *a* from those who can properly take the examination—a dictation literacy test was proposed. The form first reported was tried on a small group and seemed to the Dix staff to have the evident advantage of simplicity. It offered the further possibility of keeping away from the test situation as far as possible in the first work with a group. This seemed to be necessary, since the examiners reported that many of the men did not become at ease until after the completion of the literacy test. Since the preliminary trial of this test seemed to give good results, careful instructions for its use were drawn up. (See account of this test, p. 348.) The dictation literacy test was adopted as the main procedure for segregating literates and nonliterates at Camp Dix during the fall examining.

SECTION 5.—*Testing semiliterates, illiterates, and non-English speaking recruits.*

We have indicated above the process of segregation. Those considered sufficiently literate to take examination *a* proceeded to take that examination. In practically all cases a certain percentage of men tried examination *a* and failed to make the critical score. As a result of segregation and examination *a*, four classes of recruits remained to be given further examination—those who failed to make a satisfactory score in examination *a* (these may have been either unable to read rapidly enough or men of low-grade intelligence); the semiliterate who were split off by the preliminary segregation process; the illiterate; and the non-English speaking who have not learned to read English. A fifth group also must be considered in the general discussion. Examination *a* lays considerable emphasis on speed of performance. There is probably a small group of individuals who read well and are to be considered of average intelli-

gence or above, but who can not make the score corresponding to their intelligence level because of the speed requirement. Examination *b* giving longer time to certain of the tests was designed to retest this group. It will be discussed later.

The percentage of recruits by company units unable to make satisfactory ratings on examination *a* ranged from 0 per cent to 50 per cent, depending on the character of the group undergoing examination. The total average percentages given examinations other than examination *a* because of detected low literacy are: Devens, 20.4 per cent; Dix, 8.6 per cent; Lee, 17.7 per cent; Taylor, 7.4 per cent. (See p. 489 of this report.) As stated above, the men failing in examination *a* were retested with examination *b*, with the group skill test, or by methods devised for individual examination. All who were eliminated by segregation methods above described took either the group skill test or individual examination or both.

The definition of failure to pass the examination for literates remained open. Camp procedure varied according to the opinions of examiners, the tentative standards of line officers, or even in obedience to limitations of space and time. At one time in the course of the work one camp sent to group skill examination men who made below 100 points in examination *a;* another sent those who made 60 or less; a third, those who made 30 or less; and the fourth camp only sent to group skill those making less than 20 in examination *a*. This particular critical point concerns those recruits who had been previously judged literate. The elimination of examination *b* made it necessary to re-examine low-score men from examination *a* with group skill or individual examination.

It was necessary to make reports on unexpectedly large numbers of men thus eliminated from examination *a*. Company commanders needed more than the simple statement that these men were too illiterate to take the regular examination or unable to read orders and instructions issued in the military service. The individual examination methods given in the Examiner's Guide would not enable an examining staff to report results expeditiously on such large percentages of the recruits. The Stenquist construction test was suggested as a means of testing these men in groups or singly. (See Examiner's Guide, first revision, pp. 146 f; and pl. 12, p. 91.) It constituted, therefore, part of the equipment of the four camps and is referred to in Examiner's Guide as group skill test.

The size of groups that could be examined by this performance test varied according to physical equipment, space, and number of orderlies. As high as 60 or 75 men were often examined at once by this group method for illiterates. Relatively few men failed to show interest in the test and to make an attempt to do some portion of the test. Some score was therefore obtained for all recruits by the combined use of examination *a* and the construction test.

Special difficulties arose in connection with the handling of this test. The breakage of parts was considerable. Efforts to force pieces together twisted and deformed parts of a unit so that the subject who followed lost time and score in attempting to assemble the object. Previous experience with the objects could not be entirely controlled, and so far as investigation went seemed to be an important factor in final score. The taking apart of objects and the scoring could not be made sufficiently mechanical and both must be completed before a second group could be examined. The tendency to watch someone else for cues was so strong that special partitions were necessary to prevent copying (pl. 12, p. 91).

In the four cantonments 14,610 men were examined by this method. The statistical results are given elsewhere. Technical criticisms of the tests have also been discussed. The method gave a rough estimate of intelligence and enabled examiners to report some special information concerning each man examined. The actual significance of the test was not determined satisfactorily. (See ch. 2, pp. 321 ff, and ch. 6, pp. 363 ff.)

The failure of the skill test to correlate highly with any of the usual tests of general intelligence and to correlate satisfactorily with officers' estimates and performance of recruits in military duties, led the four staffs to seek other group methods of testing "illiterates." The difficulties of administration mentioned above directed the attention of the Devens and Lee staffs toward nonlanguage tests that could be given and scored like examination *a*. The Taylor and

Dix staffs endeavored to continue the principle of the performance test by selecting a battery of tests that would yield higher correlations with the known measures of general intelligence than did the Stenquist. The search for other tests for "illiterates" materially modified the examination procedure in Dix. The other three camps continued the use of the original group skill test. Taylor used to some extent a group cube and a dissected picture test for quick surveys of groups waiting for individual examination.

Lee used the group skill test in examining 8,049 men. The first several hundred were examined by its use according to original directions. It was then found necessary to increase the rate of examining. Correlations of several sorts were run and the staff decided to use one-half of the number of tests and reduce the time to 15 minutes. The items used were A (wrench), B (chain), D (bell), E (coin holder), and I (lock).

After this trial of the group skill Lee proposed the use of digit-symbol, symbol-digit and picture completion tests in place of Stenquist. Examination *a* and the three substitute tests correlated 0.76; short Stenquist and these three tests correlated 0.15 (47 illiterates). Work on a new test for "illiterates" stopped at this point until late in December. A complete set of tests for "illiterates" was reported at this later date but with relatively few data on their validity as a measure of intelligence. Devens also reported a complete new set of tests for "illiterates" with considerable data for criticism and further use. (See ch. 6, pp. 367 ff.)

At the close of the preliminary experiments Camp Dix reported a number of variations on the group skill test and suggested dropping tests C (paper clip), H (push button), and J (mousetrap). These are probably the more difficult items. By the elimination of these tests, mechanical difficulties because of breakage and adjustments of the materials were greatly reduced. If dropped, the total time allowed was to be reduced from 30 to 20 minutes. A preliminary scheme of weighting was also given as follows:

A	B	C	D	E	F	G	H	I	J
5	5	9	5	6	6	7	10	9	38

Camp Dix also suggested the introduction of other group skill tests. The Stenquist was to remain as one of several such tests. The group performance tests suggested and tried out by the Dix Staff are described elsewhere. (See ch. 6, pp. 363 f.) Early results on these tests indicate that low-grade and illiterate men cover a considerable range of scores but are still below the average score of unselected groups. The Dix group skill test and examination *a*, 909 cases, show a correlation of 0.475.

The group skill test at Devens passed through similar stages, but remained the important group method for examining illiterates. Devens called for a large increase in equipment almost immediately. Lee, experiencing the same difficulty, reduced the time required to give the test by reducing the number of items one-half. Taylor used it as an alternative procedure. They placed greater emphasis on a few short diagnostic performance test devised there and on the individual examinations. Dix, as shown above, emphasized its own special group method. The numbers examined by group skill test during the fall of 1917 are: Devens, 3,955; Dix, 936; Lee, 8,049; Taylor, 1,670. These totals do not include unselected groups examined in the four camps during the preliminary experimentation with methods.

Section 6.—*Individual examinations—low grade men.*

Men failing to pass group examinations went finally to special examiners, who gave them a careful individual examination. It was intended by the original plan that men failing in examination *b* or in the group skill test would be given individual examinations. In practice men were often sent directly from examination *a* to an individual examination. Men who had not been previously examined were also referred to the psychological examiners by company commanders and by psychiatrists and other medical officers. These men were always given a full individual examination. At Lee a psychologist was assigned to assist the psychiatrist at the base hospital and later one was assigned to work with the psychiatric board in its camp survey. Men examined in this way were given only individual examination.

Establishment of the basis of selection of men who should report for individual examination proved to be a difficult problem. The critical score indicating failure and the resulting necessity for individual examination varied from camp to camp and was changed several times. Efforts were made to give proper opportunity for each man to do his best and at the same time avoid a large amount of repeated examination. Men who made 40 points and even more in group skill were recalled in some camps. Others set a standard of 20 points for recall. In examination *b* men making less than 50 weighted score were recalled and given individual examination.

The methods of psychological examining in general use previous to the introduction of mental testing in the Army were not at first adopted for Army use. The tests and materials which were supplied the examiners (see Ch. 1, Pt. II, pp. 299 ff) were planned for three purposes:

(1) The determination of the mental age and intellectual ability of cases suspected of feeble-mindedness. It was believed that specially trained psychologists could made these determinations rapidly and subsequently make suitable recommendations for disposal.

(2) The detection of cases of emotional and mental instability. Preliminary data on cases giving company commanders trouble in drill, discipline, etc., followed by the testing of these cases by the psychologist, would be of great assistance to medical officers in the disposition of the cases.

(3) The determination and more definite specification of the special abilities of exceptional individuals. However, a program to solve this problem was not developed during the fall of 1917. Considerable data indicated that the second task above mentioned could be made an important adjunct to the work of the neuro-psychiatrist.

Investigations to determine standards and validity of tests for purposes described were made in the summer of 1917 prior to the beginning of work in the National Army. Over 400 individual examinations were also made by the four staffs before beginning regular programs of examining. None of the results from these preliminary try-outs was available to the camp examiners before the latter part of November, 1917. The forms received then were based on only a small portion of the data and were of little value to the staffs.

Establishment of contacts with camp authorities preparatory to group examining, the more conspicuous nature of the service to be rendered by the mental classification resulting from the group procedure, and the dearth of information on the significance of the individual testing methods provided led to several variations in procedure. Three camps did not use to any extent the tests provided. Devens prepared norms and used them to a considerable degree in testing for suspected feeble-mindedness. Dix used their battery of tests referred to above. Taylor and Lee used largely the Stanford-Binet scale, the point scale, and the Pintner-Paterson performance scale materials. Taylor, Lee, and Dix used the material in the Examiner's Guide and other tests, largely according to the preferences of the individual examiners.

The methods of individual examining originally proposed proved less satisfactory on the whole than the procedures for group examinations. Furthermore it was difficult in several of the camps to conduct individual examinations satisfactorily, and for this reason the number of individual examinations made was smaller than anticipated and the results less valuable.

The principal statistics of the work done during the fall of 1917 are presented briefly in the accompanying table, which refers only to enlisted men. The figures include negroes as well as white soldiers from camps (Dix and Lee) in which these were examined:

TABLE 142.—*Summary of results of individual examinations.*

Camp.	Number of men examined.	Individual examinations.		Referred to psychiatrists.			Rejected by psychiatrists.			
		Number.	Per cent of total.	Number.	Per cent of total.	Per cent of individual examinations.	Number.	Per cent of total.	Per cent of individuals.	Per cent of cases referred.
Devens	18,779	1,116	5.9	207	1.1	18.5	81	0.4	7.3	39.1
Dix	12,843	1,728	13.5	195	1.5	11.3	.....	.....	.....	.....
Lee	32,415	832	2.6	414	1.3	19.8	89	.3	10.7	21.5
Taylor	16,765	137	.8	75	.4	54.7	39	.2	21.9	40.0

It should not be understood that all cases referred to psychiatrists were thereby designated as suitable cases for discharge. For example, of the 414 men referred from Camp Lee, 154, or 37.2 per cent, were considered by the psychologists as unfit for the Army; the remaining 260 were referred as unfit for regular military duty but useful for service battalions. Since there was no service battalion at Camp Lee at this time, it was impossible for the psychiatrists to follow the latter recommendation.

The extreme differences among the four camps are due chiefly to local conditions. Thus in Camp Taylor the examinations were made relatively late in 1917 and there was almost no opportunity for conducting individual examinations. Otherwise five or possibly 10 times as many men would have been examined. In Camp Dix, on the other hand, although examining was late, a large number of the men was given individual examination by means of a special procedure which was devised in that station.

With reference to the number of men rejected because of mental deficiency as indicated by psychological examination, it should be stated that the figures are misleading. They show only the cases known to have been rejected on medical recommendations. In many cases men designated as referred to psychiatrists failed actually to be examined by them because of transfer or other reasons. Thus at Camp Lee, at the time the statistics of the table were compiled, only 154 of the cases referred had been examined by the psychiatrists. Undoubtedly certain additional cases, possibly a considerable number, were ultimately rejected from the various camps, but even allowing for this addition the rejections on account of intellectual deficiency would not exceed 0.5 per cent.

In this work psychological examiners had nothing whatever to do with the discharge of mentally deficient men or even of recommendations concerning the same. They were instructed through the office of the Surgeon General merely to report to the chief medical officer or to the psychiatric officer all cases of low-grade mentality or suspected mental peculiarities.

Camp Devens reports a total of 243 cases referred to medical officers for special consideration either in connection with assignment or recommendation for discharge. Of this number 36 had previously been referred by the psychiatrist to the psychologist. This leaves a total of 207 men discovered by the psychological survey of the men of the camp, who proved to be of such mental level as to demand special study, special assignment, or rejection.

Reports of commanding officers indicated that in 83.5 per cent of these cases (163 reported on), the judgment of the company commander with respect to the military value of the individual agreed with that of the psychological staff. Of cases especially recommended by the psychologists to the psychiatrists for examination, 55 per cent of 180 reported were accepted for service. This indicates that the psychologists' findings corresponded more closely with the judgment of company commanders than with the action of the medical officers especially responsible for mental problems.

Of 193 cases on which definite report of action was received at Camp Lee, 56 per cent were accepted for service by the psychiatrists. Lee also checked results of individual examining by visits to the drill grounds and conferences with company commanders. Officers were asked to pick out men who were doing poorly in drill and these cases were called back for individual examination. The distribution of 101 of these men is as follows:

Mental age	5 to 5.9	6 to 6.9	7 to 7.9	8 to 8.9	9 to 9.9	10 to 10.9	11 to 11.9	12 to 12.9	13 to 13.9	14 to 14.9
Number of cases	3	10	23	21	21	7	5	5	5	1

These visits to drill grounds also enabled the examiners to check their mental age scores. It was found that rejection could safely be recommended for practically all cases testing 7 years or lower. Men scoring between 7 and 9 years mental age were usually of questionable use to regular military organizations. The Lee staff recommended the organization of service battalions so that these men might be utilized at work suited to their abilities. One psychological staff sent all men of a mental age of 10 or below to the psychiatrist. It is probable that had this level been maintained for rejection or at least for assignment to special service bat-

talions, the army would have profited by the separation of these relatively inefficient soldier rom its combatant units.

Sample results of the work of the psychologist detailed at the request of the psychiatric survey commission at Camp Lee were summarized as follows:

Mental age	3	4	5	6	7	8	9	10	Above 10	.....
Number of cases	2	2	9	16	16	11	7	4	9	76

The psychologist reported further concerning the nature of the work:

It is interesting to note, however, that psychopathic cases have also been referred to determine the extent and nature of intellectual deterioration. Some cases of suspected hysteria, dementia præcox, aphasia, epilepsy, paresis, psychopathic personality, and constitutional inferiority have also been referred. * * * The development of such cooperation seems to be the most significant feature of the recent plan of detailing a psychologist to work with the psychiatric commission.

We have stated above that the expected service of psychologists with reference to low-grade men was completed when they had referred these men to the psychiatrist. However, their recommendation concerning disposition was requested so frequently that it became a matter of routine to indicate what seemed the best way of handling each case individually examined. It was to be expected that closer agreement between the findings of the psychologist and those of company commanders would exist than existed between psychiatrists and psychologists, for the pressure on medical men to retain all men with any possibility of becoming soldiers did not extend in the same way to psychologist and company commander. These reported only on their findings. The support given the psychiatrist by determinations of mental age and reports of inaptitude from company commanders aided him quite materially in reducing the number of mentally deficient ineffectives in the Army.

A sample distribution will nevertheless indicate that many men passed on into the Army who were below the mental age levels previously set as minima for adequate social functioning in civil life. Of this total given below, 85 are known to have been discharged. No data are at hand on the disposition or the success, if still in the Army, of the 747 others.

Table 143.

Mental ages.	3 to 3.9	4 to 4.9	5 to 5.9	6 to 6.9	7 to 7.9	8 to 8.9	9 to 9.9	10 to 10.9	11 to 11.9	12 to 12.9	13 to 13.9	14 to 14.9	15 to 15.9	16 to 16.9	9+
Point scale and Stanford-Binet	4	6	20	53	90	112	93	61	22	24	2	6	0	0	[1] 79
Pintner and Paterson performance scale	0	0	17	51	53	27	44	15	16	17	15	3	1	1	0
Total	4	6	37	104	143	139	137	76	38	41	17	9	1	1	[1] 79

[1] Cases where only an estimate was made and no full examination given.

Of these cases 52 per cent are below 9 years mental age and 39.3 per cent below 8. In terms of the total number of men examined (26,415) $1\frac{1}{3}$ per cent are below 9 and 0.9 per cent below 8. Only 85 of the number given individual examination were promptly discharged—less than 0.3 per cent of the total camp population and only 20 per cent of those below 9 years mental age. This result is typical of what is known to have occurred in the four cantonments in the fall of 1917. It also presents specifically the importance of the problem of the low-grade man in the Army organization.

Section 7.—*Group tests for literates.*

Two principal considerations caused the camp examiners to discontinue the use of examination *b*. The continued pressure for speed and fewer recalls made it advisable to simplify the procedure and hasten the delivery of reports to company commanders and to all other officers concerned. Results were demanded the day after examination. It became clear that

the usefulness of the work depended on its results being in the hands of unit commanders before the units were organized. Requests for information concerning companies, regiments, and individual recruits required immediate answers. Systematic procedure was often impossible. The more rapidly and completely a command could be handled, the easier the administration of examining became and the more open-minded were officers toward the usefulness of intelligence ratings. Examination *b* seemed an unnecessary repetition.

The second consideration that led to the disuse of examination *b* arose from the findings on it as a method. It is not our purpose to discuss these results in detail at this point. It seems more than probable that a modification of examination *b*, or, what is practically the same thing, increased time on certain tests in examination *a*, would have met two important objections to group examination *a* for literates. It was held that examination *a* was not fair to those who are "slow but sure," and that the time was so short that the majority had no opportunity to try more than half or two-thirds of the test.[1] In other words, the feeling that they had in nowise reached the limit of their ability produced among examinees considerable real dissatisfaction with the examination as a whole. Statistical studies showed that examination *b* ought to be given to all who had taken examination *a*, if it was given to any.

Examination *a* was furnished to the four cantonments with full scoring procedure, standardized norms, and detailed directions for its interpretation. No specific information on practice gains for examination *b* was available and no norms were furnished for its use. The decision to retain examination *a* without supplementary use of examination *b* seemed justified by the situation met in the camps.

Examination *b* was therefore discarded as a part of the testing procedure in three of the camps. Camp Devens continued to use it during the fall work. They reported that with its use they were able to reduce the number of individual examinations quite materially. It was given once a week to men who had made between 30 and 70 in examination *a*. If the weighted score of the seven tests of examination *b* was 70 or more, the man was excused from individual examination. By this means the amount of individual examination required was reduced to about half of what would otherwise have been indicated as necessary.

In the selection of high-grade men examination *a* exceeded the expectations of the staffs in the four cantonments. The specific successes stood out as advertising media frequently with rather alarming sharpness. It will be remembered that psychological examining began early in October, 1917. A few scattered groups were examined late in September, but these were groups selected at random, and primarily used for standardizing procedure and training examiners. The troops examined had been in camp almost two months. They were relatively few in number. As a result officers knew them and had estimated their ability on the basis of performance. Few auxiliary troop organizations had been established, hence there was an abundance of good material for special duty, for noncommissioned officer positions, for squad leaders, and assistant instructors in drill, and for teaching military regulations.

Into this locally adjusted situation psychological examining entered to pick its own clerks, to select men for special organizations, and to point out both those who had made good and those who would do so, as well as those who probably never would fit into the Army. The results were uniform in all four cantonments. The selection of clerks by means of the psychological examination from details sent the examiners for that purpose always brought complaints from company commanders that their best men were being taken away from them, that the leading men of the company were in the group selected as assistants to the examiners. Efforts on the part of commanding officers to organize new units by selecting men according to psychological score aroused similar objections. In this early period requests from company officers to designate their low-grade men were frequently received. It was soon discovered that those requests followed close on an order to select and prepare for transfer out of camp a

[1] For discussion of similar objections raised in connection with the problem of time limits for examination alpha, see ch. 9, pp. 415 ff.

certain number of men. From 80 per cent to 90 per cent of the high-grade men, as recognized by their own officers, could be positively identified by psychological examiners on the basis of scores in examination *a*.

The advertising value of the results thus obtained served primarily to give the psychological staffs confidence in their work. The amount of skepticism among psychologists was if anything greater than that exhibited by persons only slightly familiar with such work. The striking evidence from the results in the early examining was proof that the percentage of high grade men needed for company organizations could readily be selected by this means. It became evident that when the examiners gave the tests to recruits upon arrival the data would be extremely valuable in the preliminary selection of noncommissioned officers. The reports of company commanders on the value of psychological scores for their use, requested by the General Staff at the close of the fall work, indicate again and again that they could have made extremely valuable use of scores in the initial organization of their companies.

Examination *a* therefore produced immediate results. Its success, as indicated above, assured the acceptance of psychological examining so far as the merits of the proposition were concerned. Numerous specific objections were raised. Many of these have been discussed. They may be classified as administrative difficulties, criticisms aimed at validity of results or usefulness of results where considered valid, and technical criticisms of the tests themselves. The first two types of criticism were important in view of the speed required in the organization and training of divisions. Repetition of argument and even of demonstration were necessary to prove that 1,000 to 1,500 men could be put through the tests in the morning of a single day and returned in time for their afternoon drill. In the end the details of administration which so often threatened to disrupt examining and to cause its forcible ejection or to bring it at least into permanent disrepute were reduced to smoothly working plans.

Among the objections raised it was argued that, even though the results were correct and gave evidence concerning the military value of men, this information should be obtained by the company officers through contact with their men. The results could become actually harmful if they prevented the close acquaintance of officers with their men. Such information had been obtained by the officers, as shown by the close correspondence of results of the examination and officers' estimates of their men. It was, therefore, obtainable in usual ways, hence there was no necessity of burdening the Army with this additional cost in time, money, and extra officers and men to do the examining. The importance of such arguments is greatest where they refer to small units and small armies with abundance of opportunity and time for organization and training. The arguments retain validity in so far as the final product of military efficiency is measured by the close cooperation of officers and men. But, however the ultimate result to be attained might be stated, it was apparent that camp examiners were saving time. They were measuring one important quality of a soldier. Several others remained to be estimated and made common knowledge. Much important work remained before company officers would properly know their men. Armies were to be organized and it was necessary to know where exceptional ability could be found when needed. It was quickly shown by psychological scores that such ability was not evenly distributed. Extremely weak links in companies, in regiments, and in divisions were discovered by the examiners. Two regiments differed widely in mental strength within a single division. Psychological examining could point out weaknesses that extended to differences between divisions. It not merely pointed them out but indicated the specific cause where that was due to low intelligence. Numerous evidences of these inequalities are given in chapter 14.

The technical criticisms of the tests and personal objections of subjects have been discussed in the early chapters of this volume. A few may be noticed at this point, however. The mental grip of many subjects seemed weak to them; they felt unable to indicate their real ability and believed that practice would increase their available mental power. This feeling produced two criticisms—one that many officers and men had not been working at such operations as the tests covered and the tests did not therefore adequately measure their practiced abilities; the other that the time was so short for each sort of test that the subject was only fairly into the spirit

of the test before he must stop and try to understand a different one. The slow man was unfairly treated; the unpracticed one could not marshal his skill and ability in the time allowed. The importance of such criticisms for the future of testing in the Army was not overlooked. It was necessary to make the essential fairness of the examinations plain to all concerned.

The psychological staffs pointed out to critics that two to four separate examinations were often given the low-grade man before his final score was obtained. Practice gains were measured; the reliability of examination *a* was calculated. Specific cases of officers or men considered unusually rapid thinkers or especially slow thinkers were compared. Enough evidence accumulated to show that personal estimates of quick or slow thinkers were not borne out by the scores. Men of recognized ability made scores roughly equivalent to such ability in comparison with those made by other men of different standing. Discrepancies occurred also. It is impossible to say that every man was measured accurately. Sufficient proof existed, however, to substantiate the main body of results and clearly to establish the existence of errors of personal judgment. It was further acknowledged that a man might have high intellectual ability and still be useless out of or in the Army.

Section 8.—*Special studies conducted in the camps.*

Several detailed studies were made on different problems connected with examination *a*. Ten psychologists, each with somewhat different interests and training, were assigned to each of the four camps. The abundance of material, of clerical assistance at times, the novelty of the methods, all tended to provoke inquiry into the nature and validity of the testing materials. The principal work was in connection with the improvement of methods for semiliterates, illiterates, and foreigners, but, as stated, much study was given to the technique and significance of group intelligence examining.

Reference to the more important studies on the technical aspects of examination *a* will indicate the nature of the investigations begun by the different staffs during the fall of 1917.

The material supplied for examination *a* contained five different forms. By this means, coaching and other possibilities of cheating were probably reduced to the minimum. An entire series of reports concerned the relative difficulty of these different forms. Comparisons were made on the distributions of each form as a whole and detailed studies made of differences in difficulty of each test in each form. Although 36,000 cases were distributed to determine the relative difficulty of forms, no definite conclusion beyond the probability that form A was easiest and form E most difficult was reached. The inability to obtain unselected groups probably explains the reason for this failure. The method used, comparison of different groups with separate forms, hinges on equality of ability in the groups. The result proves somewhat conclusively that this method does not lead to a final statement of differences. The details of these studies concerning forms are summarized in the chapters on methods.

Some seven or eight detailed investigations were initiated to establish the relations of examination *a*, examination *b*, group skill test, and the different procedures used in individual examining. These necessitated working numerous correlation coefficients and a large amount of auxiliary statistical computation. Whenever a new test was suggested, as the group performance tests at Dix, the Devens literacy test, the use of point scale, Stanford-Binet and Pintner-Paterson performance tests at Lee or the performance tests devised at Taylor to separate age groups at the mental age of 10½, it was correlated with the tests in use, on Army recruits and on groups of known mental age or known mental ability in civil institutions.

Examination *a* was also studied in its relation to different levels of intelligence. Its diagnostic value was measured for different army grades and correlations computed for its value in comparison with officers' estimates. Several reports were prepared on the relation of scores to age, reported schooling, salary, previous occupation, etc. Detailed studies were made of certain groups, notably the Three hundred and third Engineers at Dix and the Three hundred and thirty-third Infantry at Taylor. A total of 166 special reports were prepared and submitted by January 1, 1918. Half as many more were in preparation and were completed during the two following months.

These investigations were at all times made secondary to the conduct of examining, establishment of relations with camp authorities, and immediate service to the existing organizations. Nevertheless, the importance of these studies to the development of this new service in the Army should not be underestimated. They were necessary to assure the examiners themselves of the essential soundness of their methods. Investigations could not be made rapidly enough to supply answers to questions and criticisms raised by officers and inspectors of the service. Requests for additional assistance were often based on the reports of studies verbally communicated by members of the psychological staff. Conferences with commanding officers, in which the results of these studies were presented, led to changes in methods of selecting candidate officers and noncommissioned officers, to the reorganization of divisional units, and to the reconsideration by their superior officers of many officers and men. The importance of the reported investigations for the later revision of methods is stressed in the section on methods.

SECTION 9.—*Work of the clerical staff.*

The necessity of an efficient and fairly extensive clerical staff to insure accurate and prompt reports to the military authorities is evident. Even with the reduction in the task of scoring papers brought about by the use of stencils, the work of grading separate tests, totaling scores, and making up reports for company commanders, covering, perhaps, a thousand or more men in one day, was no light task.

The clerical force was selected as far as possible on the basis of their scores in examination *a*. A and B men were preferred. The staff of enlisted men used as orderlies, scorers, stenographers, recording clerks, filing clerks, supply clerks, and as assistants in individual examinations varied from 20 to 65 or more. The number varied mainly according to the speed of examining. The statistical treatment of results, important for revision of method, was largely done by the psychologists when not examining recruits.

No single method was in use to insure the minimum of error in scoring, recording, and reporting results. The general principles of checking results were put into operation, and from reports on errors seemed to be successfully applied.

Full reports containing names and scores were made to company commanders, to the Washington office, and were also kept on file in the office of the psychological staff in the camp. Statistical and graphical summaries were made and reported to regimental and divisional commanders. These are reproduced in part in the section on results (Ch. 14).

SECTION 10.—*Summary of camp activities.*

The discussion of the psychological examining in the fall of 1917 and the presentation of the results involves two main considerations. It is essential to remember in the following presentation of statistical results and estimates of values that many new and unexpected conditions had to be met. The foregoing account presents only the more important of these. Many changes in examining procedure and in camp conditions not enumerated necessitated slight modifications of the work. These though not affecting the practical aspects of the examining do make it impossible to present a finished statistical summary.

In the second place the fall work was deliberately experimental in method and in practical application. We have endeavored to show the main lines of this experimentation.

First the problem of illiteracy in its various degrees was encountered. Examinations *a* and *b*, requiring an undetermined ability to read English, could not be used to measure approximately 20 per cent of the recruits. The methods of individual examining supplied and the available standard methods, with one exception, required at least the ability to speak and understand English. The group skill test and certain of the tests for individual examination were prepared to meet this difficulty. This problem when faced in the four cantonments broke up into three parts. By what means could those unable to record their real mental age by scores in the examinations for literates be detected? Was it necessary to obtain and report a literacy grade for any or for all recruits? Were the methods supplied for testing the semiliterate, the

illiterate, and the foreign speaking adequate? We have summarized the efforts of the staffs to answer these. The literacy test supplied proved inadequate. All four staffs finally adopted criteria such as ability to write one's name or to read a simple sentence, or the lowest possible positive score on the literacy test, as the point of segregation. The degree of literacy obtained by these methods probably differed quite widely. They nevertheless had one point in common; they enabled examiners to segregate groups rapidly. Three staffs answered the second question by making no special report on the literacy of recruits. The Camp Devens staff invented and standardized a new method for giving literacy grades to all recruits. The methods supplied for testing the group of "illiterates" did not prove satisfactory. The group skill test was not testing abilities similar to those tested by examination *a;* the individual examination methods were only partly suited for testing foreign speaking and actual illiterates. The necessity for a group examination that would test the "illiterate" group and give results more nearly comparable to the results of examination *a* was clearly demonstrated.

In the second place the detection of the feeble-minded and those unfit for military service because of inadequate intelligence proved to be possible. The four different staffs demonstrated that they could be valuable assistants to medical and line officers in handling these cases. The need for additional methods for individual examining came out definitely in connection with efforts to test "illiterate" and non-English speaking with such standard methods as the point scale and Stanford-Binet.

Finally the method of examining men in groups for intellectual status was fully and satisfactorily demonstrated.

The immediately practical results of the work of the psychological examiners during the fall examining were primarily demonstrations of the variety of ways in which their services could be made useful, rather than of the amounts of such practical service. They demonstrated the usefulness of the tests in selecting high-grade men, in picking out the mentally deficient and men of low military value, in detecting wide variations in the mental strength of companies, regiments, and divisions, in forming units of uniform, superior, or inferior intellectual ability, and in the analysis of cases presenting various peculiarities of behavior, such as summary and general court-martial cases or cases unable to learn drill or other military duties.

CHAPTER 14.

SUMMARY OF DATA CONCERNING GROUPS EXAMINED.

SECTION 1.—*Limitations affecting consideration of results.*

The account in the preceding chapter of conditions underlying intelligence examining in the first four cantonments should make it clear that results obtained must be considered as suggestive rather than as conclusive. They may indicate probable directions of likeness or difference, which later experimentation may establish or disprove, but except where differences are very striking can not be offered as final evidence. The main contribution of the fall work must be recognized as having been made in the very direct ways of meeting immediate local needs and of devising more effective means of meeting similar demands in the future. Planning of work with a view to complete and adequate presentation of results at the expense of such direct service was strictly ruled out by the stress of the military situation.

Accordingly, when the attempt is made to compare groups in the light of the results obtained, numerous limitations appear which emphasize the fact that only large crude differences can be treated as significant. Finer distinctions must be lost sight of, because of the uncertainty as to whether it is the groups which differ or the local background of selection. In certain cases the cumulative value of comparisons made separately in each of the four stations adds contributory evidence of value. For example, if branches of the service are being considered, and it is found that the differences, even though slight, are in the same direction for all camps, interpretation regarding the relative standing of these branches under the conditions which obtained during the fall seems relatively safe. If, on the other hand, there is variation in rank order, this may mean either that the groups are quite different in the different camps or that irregularities of procedure obscured the comparison. For this reason it is especially important that consideration of results be not limited to the summarized total for all four camps. A certain interest attaches also to the possibility of checking the reliability of suggested differences by comparing these with results secured later with more adequately developed methods, thus obtaining a still more important weight of cumulative evidence.

The limitations which affect the interpretation of results determine largely the method of presentation of material. The necessary adjustments made in the treatment of the data will be discussed later. At this point we shall merely note the main lines of limitation.

One basic limitation is due directly to the character of the examining methods, the fact that examination *a* presupposes a certain degree of literacy in English, and that a considerable number of men were, therefore, eliminated from the possibility of measurement by this examination. Unfortunately men are lost in varying proportions from different groups, so that this loss can not be treated as a constant factor. Moreover, as has been indicated, the methods of segregation were sufficiently variable from camp to camp, and from one time to another within the same camp, so that the men eliminated can not be thought of as even a definite type of case. In other words, it is not possible to drop them from the groups and compare the remainder as representing the literates of all groups, with any intention of implying that the same thing is meant by "literates" in all cases. It has been shown that the standards of literacy set up as prerequisite for examination *a* varied from an approximation to sixth grade requirements to little more than ability to write one's name. To complicate the problem further there is the fact that in the early period of the work certain groups were examined completely by examination *a*, as, for example, the major part of the Three hundred and third Engineers at Camp Dix. From the data alone we should be led to infer that these men were, therefore, all literates. In later discussions we shall use the term "illiterates" to designate cases eliminated on the ground of illiteracy, without meaning to indicate that the proportions

of these can be used as an actual basis of comparison of percentages of illiteracy in the various groups. The numbers are offered rather as necessary descriptive background and as a check on interpretation of results.

Another main type of limitation is that due to variations in the general conditions of examining. Groups were examined with varying degrees of completeness, the selection being sometimes such as to afford probably a random sample of the whole and sometimes affected by a very definite bias of some sort. An important illustration of the latter type of variation is the case of Camp Taylor as compared with Camp Lee. The work of examining began late in the former camp and as a result a considerable number of men, picked by their officers as inferior, were known to have been eliminated from the division before the examining began. No such selection occurred at Lee prior to the examinations. In fact, any man suspected of low mentality was especially likely to be sent to the psychologists for examination. Obviously this difference between the camps should not be overlooked, even though it is impossible to gauge it in quantitative terms in considering the results. Unfortunately in the majority of cases the variations which existed were not known, or at least were not made a matter of record.

Still a third limitation of importance arose from the general characteristics of the Army which was being examined—the fact that it was largely an unknown quantity from the military point of view. For example, in considering branch of the service, we are dealing not with established units of known efficiency but with organizations just assembled from the incoming draft. Obviously we can not expect to obtain from such elements norms which could be used as standards to indicate the needs of different branches. The most that can be hoped for is descriptive material, yielding information as to what was actually selected for each type of service. Unfortunately the groups are imperfect even for this use, since many of the units were unfinished organizations. Before going into active service they both lost and gained men, thereby possibly changing their character to a marked degree.

In presenting the data we shall follow the original separation by camps for each type of comparison offered. Except in case of the officers' training camp candidates data have been confined to examinations given prior to January 1, 1918, although the fall methods were continued without radical change until the latter part of April, 1918. The totals given in various tables will often fail to agree with one another, since it has been necessary to make up the present statement from summaries made from the material at various stages of completion. No attempt will be made to note these discrepancies in detail as they occur. Since it was impossible to handle all the cards at one time and by a uniform method, such discrepancies were inevitable.

SECTION 2.—*Comparison of camps, enlisted men.*

Within each National Army camp it was expected that a series of divisions would be formed and trained. The Seventy-sixth Division, National Army, was to be the first formed from recruits sent to Camp Devens; the Seventy-eighth was to form at Camp Dix; the Eightieth at Camp Lee; and the Eighty-fourth, out of those drafted men sent to Camp Taylor. A permanent camp organization consisting of a depot brigade, remount depot, camp quartermaster unit, base hospital, and a few smaller separate units was also to be organized at the same time in each camp. Later changes in this general plan did not affect the organization of the camps before the close of the fall examining.

Since these four camps, drawing from different sections of the country, furnished the material for the fall survey, it is of interest to know whether appreciable differences appeared in the mental caliber of the different stations. Ultimately such information regarding camps would be of great importance to the Army. For example, a camp of relatively low caliber should be expected to have an unusually large proportion of cases for discharge, assignment to development battalions or labor organizations, etc. On the other hand, it should not be expected to furnish the same quota of men for officers' training schools, as a camp of superior grade.

In tables 144 and 145 we present the percentage distribution of scores of white enlisted men from each camp, together with certain constants computed from these data. In table 144 those excluded from examination *a* on the ground of illiteracy are included for consideration

in the total, whereas in table 145 only those men who actually took examination *a* are included. The two tables should not be considered without reference to each other. They serve to illustrate quite clearly the type of problem which arises because of the elimination of illiterates, and the necessary consequent adjustments in the treatment of data.

Figure 2 shows graphically the data of table 144 summarized by letter grades.

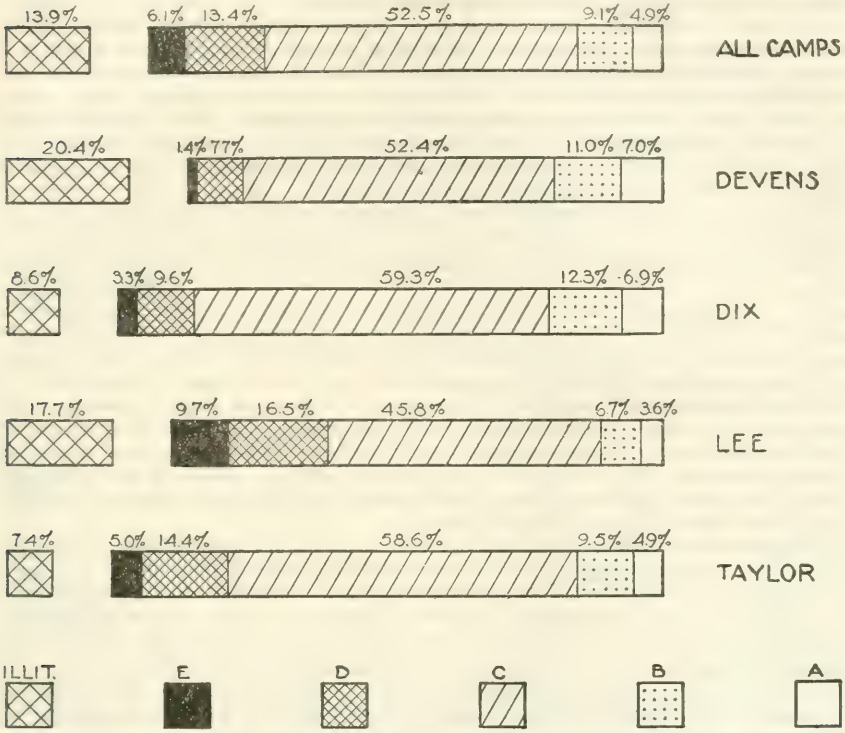


FIG. 2. Comparison of camps, showing percentage in each letter grade. Examination *a*. White enlisted men: Total, 65,267; Devens, 10,926; Dix, 10,936; Lee, 26,640. Taylor, 16,765.

TABLE 144.—*Percentage distribution of scores by camps—examination a—enlisted men (white), all cases, including those unable to take examination a because of illiteracy.*[1]

Score.	Grade.	Devens, Seventy-sixth Division.	Dix, Seventy-eighth Division.	Lee, Eightieth Division.	Taylor, Eighty-fourth Division.	All four camps.
350-414	A	1.5	0.9	0.5	0.5	0.7
300-349	A	5.5	6.0	3.1	4.4	4.2
250-299	B	11.0	12.3	6.7	9.5	9.1
200-249	C+	15.2	18.1	11.1	15.7	14.2
150-199	C	19.6	21.8	16.0	21.6	19.0
100-149	C−	17.6	19.4	18.7	21.3	19.3
50-99	D	7.7	9.6	16.5	14.4	13.4
0-49	E	1.4	3.3	9.7	5.0	6.1
Eliminated as illiterate		20.4	8.6	17.7	7.4	13.9
Number of cases		10,926	10,936	26,640	16,765	65,267
Median (Md.)		157	171	116	154	143
Upper quartile (Q_3)[1]		227	234	189	216	212
Range from Q_3 to Md.[1]		70	63	73	62	69
Percentage A or B		18.0	19.2	10.3	14.4	14.0

[1] Medians are computed on the assumption that the cases eliminated as illiterate would have appeared in the lower half of the distribution; upper quartiles on the assumption that they would have appeared below the highest quarter.

Referring to table 144 and figure 2 we note first the variation in percentages eliminated as illiterate in the different camps, ranging from 7.4 per cent at Camp Taylor to 20.4 per cent at Camp Devens. This precipitates at once the question whether we can take these data at their face value and conclude that Devens is actually characterized by a peculiarly large percentage of illiterates (including the foreigners illiterate in English), and whether the other camps are characterized by the relative per cents indicated.

Two lines of evidence bear upon this point. The first of these is drawn from the known facts regarding procedure, as given on pages 473 ff. chapter 13. It has been shown there that the standard for segregation recommended by Camp Devens and tried out for at least part of the time was higher than that used consistently by any of the other camps. Camp Lee, on the other hand, set up very nearly a minimal requirement. When, therefore, we find Camp Devens credited with 20.4 per cent illiterates as compared with 17.7 per cent for Lee, it seems probable that this is more significant of differences in standards of segregation than of differences in numbers of "illiterates."

We note also, as shown clearly by figure 2, that, whereas Camp Lee has both a large proportion of illiterates and a large proportion of D and E men left over after elimination of the so-called illiterates, Camp Devens has a large proportion of illiterates, but a very small proportion of D and E cases as compared not only with Camp Lee but with Camps Dix and Taylor as well. This fact suggests that the high literacy standard of Camp Devens operated to exclude considerable numbers of the men of inferior intelligence. This probability reduces the significance of the data concerning relative numbers of men making low scores in the various groups.

If the group actually excluded from examination is to be treated as an integral part of the whole, certain assumptions regarding the mentality of these cases become necessary. The assumption which seems best justified is that such cases would mass toward the lower portion of the intelligence scale. Results obtained later by the use of examination beta, designed for illiterates show that this is the case to such an extent that the number of men eliminated making scores above the average is small in comparison with the total and that the number making scores above the upper quartile is negligible.

One conclusion following upon this assumption is that the significance of percentages making given scores for intelligence increases toward the upper portion of the intelligence scale. Stated in other terms we can compare the groups with respect to the proportions of superior men with a reasonable degree of accuracy, whereas we can not, from the present data, compare them with reference to their proportions of inferior men. Accordingly we have shown in table 144 the percentages of men making A and B grades, and would call especial attention to the relative lengths of the bars representing these two grades in figure 2. From this point of view the order of the camps from best to poorest is Dix, Devens, Taylor, Lee, although the difference between Dix and Devens (1.2 per cent) is too small to emphasize.

Comparison of groups in terms of some measure of central tendency seems also desirable. We have chosen the median for this purpose since it was possible by this means to compare total groups, assuming that the cases excluded for illiteracy would fall in the lower half of the group. Medians computed thus are shown in table 144. Here, again, the order of excellence of the camps is Dix, Devens, Taylor, and Lee, showing in this case a marked superiority for Dix and only a slight difference between Devens and Taylor. The upper quartiles, which are less affected than the medians by the uncertainty regarding the "illiterates," show the same order, with Devens approximating more closely to Dix and more widely separated from Taylor. Lower quartiles were not computed, since the assumption that the excluded groups would fall in the lowest 25 per cent seemed quite unjustified. Instead of offering the quartile deviation (semi-interquartile range) as a measure of dispersion we therefore show the range from the median to the upper quartile. If we could assume the distribution to be symmetrical this measure would be identical with the quartile deviation. Since we have no data in support of this assumption we offer this as indicating merely the range of variation for that portion of the scale which we are justified in considering. The measure indicates a slightly wider scatter of cases toward the upper end of the scale in the case of Lee and Devens than in the case of Dix and Taylor.

If we turn to table 145, which differs from table 144 by the fact that only cases who actually took examination *a* are considered in finding percentages and in computing constants, we note that the only change in order of excellence of camps occurs between Dix and Devens, Devens taking precedence to a slight degree by this method. This order holds whether we consider percentages of "superior" (A and B grade) cases, medians, or upper or lower quartiles. The quartile deviations do not differ from one another except for Camp Lee, which shows a slightly greater amount of dispersion than the other camps.

The outstanding facts concerning the relative mental status of the four camps appear, therefore, to be the following: (1) On any basis of comparison Camp Lee is clearly indicated as the lowest of the four; (2) similarly on any basis of comparison Camp Taylor stands next in rank, though not always sharply contrasted with the camp next above it. In view of the facts mentioned previously regarding elimination of an appreciable number of low-grade cases before any examining was done at Camp Taylor, it seems safe to conclude that the relative standing of this camp was at least as low as the results indicate. It may, in fact, have approximated more closely to the position of Camp Lee than is indicated. (3) The relative precedence of Dix or Devens is determined by the basis of comparison used. By the one which compares total groups and which appears the more justifiable at least a slight superiority in favor of Dix is indicated.

TABLE 145.—*Percentage distribution of scores by camps: Examination a—Enlisted men (white)—Literate cases only.*

Score.	Grade.	Devens, Seventy-sixth Division.	Dix, Seventy-eighth Division.	Lee, Eightieth Division.	Taylor, Eighty-fourth Division.	All four camps.
350-414	A	1.9	1.0	0.6	0.5	0.9
300-349	A	6.9	6.5	3.7	4.7	5.0
250-299	B	13.8	13.4	8.2	10.3	10.6
200-249	C+	19.1	19.8	13.5	17.0	16.4
150-199	C	24.7	23.9	19.5	23.4	22.1
100-149	C−	22.1	21.3	22.7	23.0	22.4
50-99	D	9.7	10.6	20.0	15.6	15.5
0-49	E	1.8	3.7	11.8	5.4	7.0
Number of cases		8,695	9,999	21,924	15,522	56,140
Median		183	180	140	163	161
Upper quartile (Q_3)		244	240	204	222	224
Lower quartile (Q_1)		131	125	83	109	105
Quartile deviation (Q_D)		57	57	60	57	59
Percentage A or B		22.6	20.9	12.5	15.5	16.5

The final columns of tables 144 and 145 and the upper bar of figure 2 show the combined data from all stations. Since Camps Lee and Taylor, which have been shown to have a lower intelligence ranking than the other two camps, furnished over two-thirds of the total number of cases as here combined, it is evident that there is probably an overweighting of this total toward the lower portion of the scale. There is, however, no information regarding the best distribution of proportions among the several camps to obtain a representative sample of men recruited during the summer and fall of 1917.

SECTION 3.—*Additional data regarding enlisted men, by camps.*

In addition to the foregoing rough summary of data on enlisted men for comparative purposes, further more detailed figures are available regarding scores in examination *a*. Since all such data presupposes a preliminary exclusion of illiterates, it is open to all the objections previously noted (see p. 490) in so far as it is used for comparison of camps. Our intention in presenting the more detailed figures at present is therefore not that of comparison, for which we consider the previous material more adequate. The figures are offered rather to furnish more adequate descriptive material regarding the various camps and to afford more exact norms for future reference. For the latter purpose a special value attaches to figures on a given camp group, which may be interpreted in the light of the geographical selection of its members and with reference to the basis of segregation for literacy actually employed (see pp. 473 ff.). We present in table 146 the percentage distribution in examination *a* of enlisted

men of the several camps, as well as the percentage distribution of the total actually reported from all four camps. The final column shows the percentage distribution of a total made up of the four camps so combined that equal weight is assigned to each. It is evident from the table that it makes little difference in this case which method of combining is used.

Figure 3 presents graphically the percentage distributions of the four camps. Superimposed on the distribution for each camp is that for the four camps averaged. Though comparison of camps is not our purpose at this point, it is of interest to bear in mind the status of each camp with reference to the whole. Certain conspicuous differences in type of curve also appear. Means, with their probable errors and standard deviations, are indicated on each figure and given also in table 147.

In spite of all limitations which have been noted on the completeness and the random character of these samples they nevertheless represent more nearly than any data on menta measurements hitherto available random samples of the adult male population. As such they should be of great service in furnishing standards of reference for use in interpretation of other groups.

TABLE 146.—*Percentage distribution of scores by camps: Examination a—Enlisted men (white)—Literate cases only.*

Score.	Devens.	Dix.	Lee.	Taylor.	All four camps.	Averages of percentages (four camps).
410-419	.....	.....	.....	.....	.....	.....
400-409	.....	[1] 0.0	[1] 0.0	.....	[1] 0.0	[1] 0.0
390-399	[1] 0.0	1.0	1.0	[1] 0.0	1.0	1.0
380-389	.1	.1	[1] 0.0	.1	.1	.1
370-379	.2	.2	.1	.1	.1	.1
360-369	.3	.3	.1	.2	.2	.2
350-359	.5	.5	.3	.3	.4	.4
340-349	.7	.8	.4	.6	.6	.6
330-339	1.2	1.0	.7	.7	.8	.9
320-329	1.3	1.4	.7	.9	1.0	1.1
310-319	1.6	1.7	1.1	1.2	1.3	1.4
300-309	2.0	1.8	1.1	1.5	1.5	1.6
290-299	2.1	2.2	1.2	1.8	1.8	1.8
280-289	2.6	2.6	1.6	1.9	2.1	2.2
270-279	2.8	2.7	1.6	2.0	2.2	2.3
260-269	2.9	2.7	1.6	2.2	2.2	2.3
250-259	3.0	3.3	2.2	2.5	2.7	2.7
240-249	3.4	3.5	2.3	2.9	2.9	3.0
230-239	4.0	3.9	2.4	3.3	3.3	3.3
220-229	4.1	4.0	2.8	3.3	3.5	3.6
210-219	4.0	4.2	2.9	3.6	3.6	3.7
200-209	4.7	4.4	3.0	4.0	3.9	4.0
190-199	4.8	4.6	3.3	4.4	4.1	4.3
180-189	5.1	4.6	3.9	4.5	4.5	4.5
170-179	5.2	4.9	3.9	5.0	4.6	4.7
160-169	5.2	5.0	4.1	4.8	4.7	4.8
150-159	5.1	4.9	4.3	5.0	4.7	4.8
140-149	5.0	4.7	4.7	4.9	4.8	4.8
130-139	4.9	4.7	4.4	5.0	4.7	4.7
120-129	4.4	4.4	4.5	4.6	4.5	4.5
110-119	4.0	4.0	4.6	4.6	4.3	4.3
100-109	3.4	3.5	4.6	4.2	4.0	3.9
90-99	2.9	2.8	4.4	3.9	3.6	3.5
80-89	2.3	2.8	4.0	3.5	3.3	3.2
70-79	2.1	1.9	4.4	3.3	3.0	2.9
60-69	1.6	1.8	3.7	2.8	2.6	2.5
50-59	1.1	1.3	3.6	2.0	2.2	2.1
40-49	.8	.9	3.5	1.6	1.9	1.7
30-39	.5	.8	2.6	1.4	1.5	1.3
20-29	.2	.7	2.5	.9	1.2	1.1
10-19	.1	.5	2.0	.5	.9	.8
0-9	.1	.4	1.2	.3	.6	.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of cases	15,270	11,380	21,924	15,073	63,647	.....

[1] Indicates less than 0.1 per cent.

TABLE 147.—*Examination a—Means and standard deviations—White enlisted men by camps.*

	Devens.	Dix.	Lee.	Taylor.	All four camps.
Mean	187.7	184.3	147.6	168.3	168.7
± P. E.	±.40	±.48	±.37	±.42	±.21
σ	73.3	76.4	81.8	75.7	79.0
Number of cases	15,270	11,380	21,924	15,073	63,647

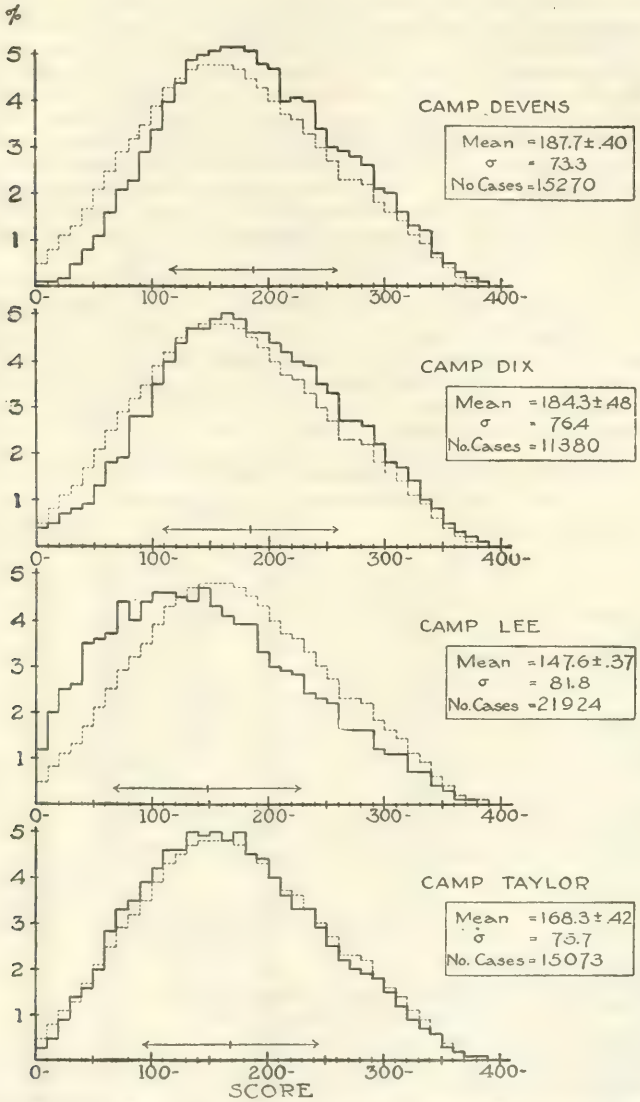


FIG. 3. Percentage distributions. White enlisted men of Camps Devens, Dix, Lee, and Taylor. The dotted curve represents in each case the average percentage distribution for the four camps.

SECTION 4.—*Comparison of branches of the service.*

Table 148 presents data on enlisted men of the various branches of the service. All figures of this table have been obtained on the assumption that those segregated as "illiterate" may be treated as falling in the lower half of the distribution and the complete groups thus compared. The percentages eliminated as "illiterate" have been noted for each group, chiefly for their value as indicative of the extent to which any given group was examined by *a*. Within any given camp these figures doubtless indicate roughly the relative degrees of illiteracy of the various branches, in accordance with the standards of literacy set up for the camp in question (see pp. 473 ff.). Exception to this statement should be noted in the case of the Engineers at Camp Dix. Figures for this group regarding percentages eliminated as illiterate are not comparable with those for other branches at this camp, since the Engineers were examined with an exceptionally high degree of thoroughness, and men who would ordinarily have been segregated from the rest were retained in group examination *a*.

By reference to table 148, comparison of the various branches may be made on the basis of median scores, upper quartiles, or percentages of superior (A and B) cases. Slightly different results would be obtained according as one or another of these measures is used, though they do not differ widely in direction. We shall use the median as the main basis of comparison. The relative excellence of the various branches within the several camps may be obtained readily from table 148. Comparison of the general trend of these results, as influenced by the data from all four camps, is further facilitated by figure 4.

TABLE 148.—*Examination a—Comparison of branches of the service by camps—Enlisted men (white)—Computations based on all cases, including illiterates.*

Camp and branch of service.	Number of cases.	Percentage eliminated as "illiterate."	Median: Md.	Upper Quartile: Q_3.	Range: Q_3 to Md.	Percentage A and B.
Devens:						
Infantry	10,032	22.2	152	218	66	15.2
Machine Gun Battalions	1,402	20.8	137	198	61	11.1
Field Artillery	3,451	22.0	164	226	62	18.1
Engineers	1,276	15.1	164	235	71	20.6
Field Signal Battalion	293	2.1	253	299	46	50.9
Sanitary Train	688	6.1	188	246	58	23.6
Supply Train	316	14.0	163	209	45	13.9
Ammunition Train	745	18.3	166	231	65	17.0
Dix:						
Infantry	4,325	10.3	164	229	65	17.9
Machine Gun Battalions	744	10.3	151	206	55	13.2
Field Artillery	2,076	4.0	179	239	60	20.7
Engineers	1,183	3.1	156	221	65	16.6
Field Signal Battalion	178	0.6	233	292	59	42.1
Sanitary Train	458	5.9	192	251	59	25.6
Lee:						
Infantry	13,077	18.5	110	181	71	9.5
Machine Gun Battalions	1,287	13.8	131	198	67	10.0
Field Artillery	4,552	16.0	106	171	65	7.8
Engineers	1,266	23.5	128	204	76	12.5
Field Signal Battalion	168	.0	219	268	49	35.1
Sanitary Train	441	.9	190	242	52	21.5
Ammunition train	975	17.8	141	213	72	13.6
Taylor:						
Infantry	5,992	6.2	148	207	59	12.1
Machine Gun Battalions	954	5.0	154	205	51	11.0
Field Artillery	1,824	1.8	170	221	51	14.2
Engineers	588	1.5	193	258	65	27.4
Field Signal Battalion	330	.0	244	290	46	46.9
Sanitary Train	629	3.0	205	261	56	30.1
Supply Train	139	.0	119	172	53	5.0
Ammunition Train	402	.5	153	216	63	14.4
All four camps (based on actual totals):						
Infantry	33,426	16.3	137	205	68	12.8
Machine Gun Battalions	4,387	13.5	142	201	59	11.1
Field Artillery	11,899	13.5	147	212	65	14.0
Engineers	4,583	11.8	160	229	69	18.6
Field Signal Battalion	969	.7	240	290	50	45.2
Sanitary Train	2,216	4.2	194	251	57	25.4
Supply Train (2)	455	9.7	147	203	56	11.1
Ammunition Train (3)	2,122	14.8	152	220	68	14.9
All four camps (based on averages of percentages):						
Infantry	.....	14.5	144	211	67	13.7
Machine Gun Battalions	.....	12.5	143	201	58	11.3
Field Artillery	.....	11.0	157	220	63	15.2
Engineers	.....	10.8	163	231	68	19.3
Field Signal Battalion	.....	.7	237	288	51	43.8
Sanitary Train	.....	4.0	194	250	56	25.2
Supply Train (2)	.....	7.0	138	196	58	9.5
Ammunition Train (3)	.....	12.3	153	220	67	15.0

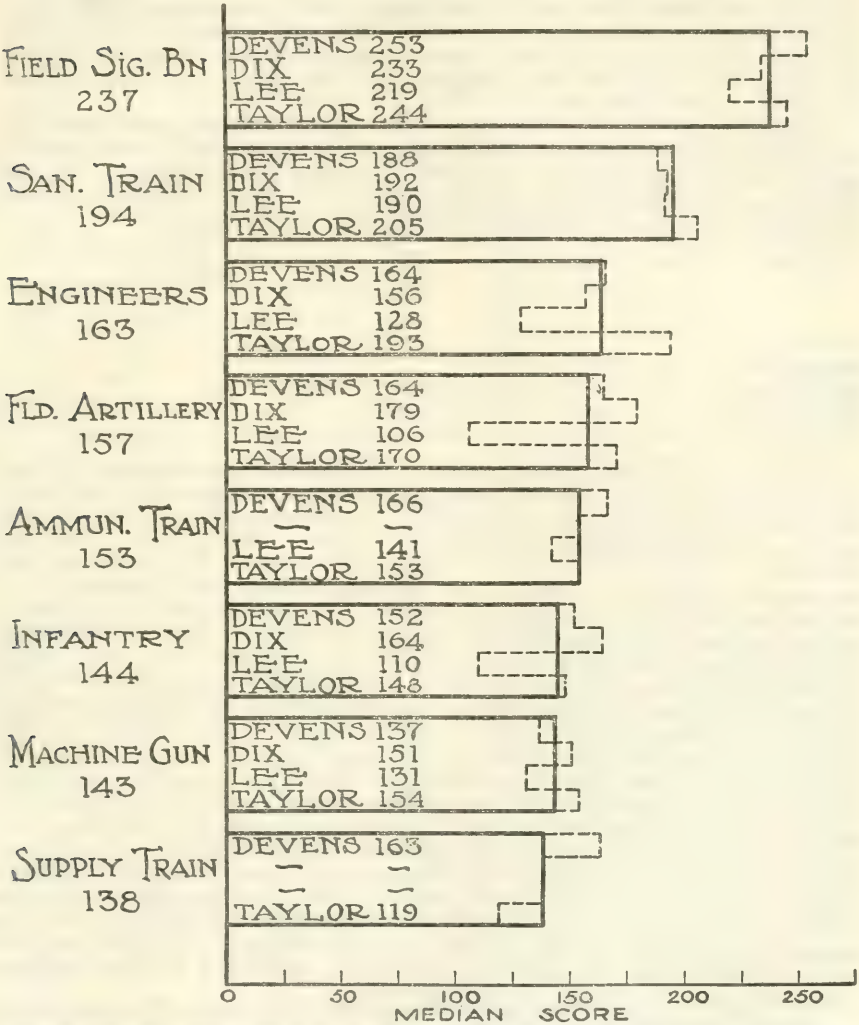


FIG. 4. Medians scores in examination *a* for various branches of the service. White enlisted men. The main bars outlined in heavy lines represent medians for combined data from all four camps, each camp being given equal weight in the combination. Figures below the names of the various branches give the numerical values of these medians. Dotted lines represent the medians for the separate camps, the numerical values of which are given beside the names of the camps.

In this figure the dotted lines representing the medians of the various camps are of importance as indicating the degree of variability from camp to camp, and accordingly the extent to which the combined data correctly represent the separate camps. Reference to the graph shows that the variation among the camps in absolute values of the medians for the various branches is large, the most constant element of variability being introduced by the low scores characteristic of Camp Lee. An extreme instance appears in case of the Field Artillery, where the medians vary from 106 for Lee to 179 for Dix. The Sanitary Train shows the most consistent results for the four camps.

Not only do the camps vary with respect to the absolute scores for given branches, but they differ also to some extent with respect to the relative standing of the various branches, and very markedly with reference to the degree of difference between branches. The order of excellence, as indicated by the median scores, is as follows for each camp separately, and for the combination based on averages of percentages from all four camps:

Branch.	Rank order for—				
	Devens.	Dix.	Lee.	Taylor.	All four camps.
Field Signal Battalion	1	1	1	1	1
Sanitary Train	2	2	2	2	2
Engineers	3.5	5	4	3	3
Field Artillery	3.5	3	6	4	4
Infantry	5	4	5	6	5
Machine Gun Battalions	6	6	3	5	6

In many cases differences are far too slight to have any significance, consisting sometimes of only one or two points. The chief bearing of the above table in connection with figure 4 is to emphasize the necessary points of caution to be exercised in connection with the interpretation of apparent differences. We may note the following points: The Field Signal Battalion and the Sanitary Train stand out conspicuously as superior to the other branches, whether the combination of all camps or the individual camps are under consideration. Of the two the former appears distinctly as the superior. No other distinction shows as high a degree of certainty. The suggestion of the data is that the Engineers and Field Artillery tend to be superior to the Infantry and Machine Gun groups, though distinction between the two members of either pair can not safely be made. In spite of the relative superiority indicated in favor of the Engineers and Field Artillery, it may be noted that the Engineers drop to fifth place for one camp and the Field Artillery to sixth in another—shifts which have their complement in the fact that Infantry shifts to fourth place for one and Machine Gun to third place for the other of these camps. The status of the Ammunition Train and the Supply Train can not be discussed profitably, since data on these were not furnished from all camps, and the information is therefore even less satisfactory than that for the other branches.

The main point which these data emphasize is the fact that the branches of the service as examined in the fall show relatively slight differences, with the exception of the Field Signal Battalion and the Sanitary Train, which stand out clearly from the rest. The remaining differences are so small, and so influenced by the variability among the camps, that no stress can be laid on the trend indicated. Reference to the following section will show that much greater differences than these appear at times between regiments in any given branch of service or between companies in any given regiment.

It will be remembered that attention has been called to the necessity of caution in interpreting differences between military groups made up from the unknown draft elements and on the relatively slight military experience available in the fall to determine assignments. It has been noted further that there was opportunity for much shaking down and readjustment within branches and organizations before divisions were actually sent overseas. Of differences between branches of the divisions under consideration, as these were made up at the time of embarkation, we have no knowledge.

It may be noted, further, that, even had such information been available, it would not have provided the norms for the various branches so urgently needed if the psychological examinations were to become practically serviceable in connection with assignment to branches of the service. Data for such use could only be obtained from established units which had been tried out and found to meet the needs of their respective branches. The early fall work on the problem was particularly significant in setting the problem and in showing the dearth of information available for its solution. In addition to the mere differences in excellence, as indicated by any of several measures, the possible importance of other types of difference was also recognized; the fact that certain branches might require a relatively normal distribution of mental ability, with the majority of cases massing about the average and a gradual dropping off in either direction, whereas other branches might require a large percentage of high-grade men and might at the same time be able to utilize a considerable proportion of relatively low-grade cases, thus giving possibly a bimodal distribution. These problems await solution, which could be reached, as has been said, only by study of units of known value. The importance of such information in meeting any future emergency is obvious.

Section 5.—*Comparison of organizations (regiments and companies).*

Comparison of smaller organizations within the military system involves the problem of inequality among units which have no apparent differences in function. Within a given brigade of a given division, conspicuous differences between regiments would seem to represent an element of weakness in the whole military organization, except in so far as the development of a certain number of "crack" regiments may be a part of the military policy. Similarly, marked inequalities of companies within a given regiment appear undesirable, since they introduce difficulties in training and place unnecessarily heavy burdens upon commanders of low-grade groups. A company which has a meager percentage of high-grade cases, moreover, is seriously handicapped in providing suitable men for noncommissioned officers or lines of work calling for superior ability.

The service which the psychological examinations might render in connection with balancing of regiments and of companies with reference to mental ability was early recognized and pointed out. The lack of standards for units did not handicap this line of usefulness, as it did the application of psychological results to the assignment of men to various branches of the service. The main thing of importance was to demonstrate the inequalities present at any given stage of completeness of the organization. In case of a relatively incomplete organization differences could be reduced or eliminated by proper selection of cases from the incoming draft for assignment to the various groups. In case of a relatively complete organization, on the other hand, adjustments could only be made by shifting of men from one group to another.

The facts regarding inequalities were brought to the attention of the military authorities in the various camps, especially in the form of certain effective graphic presentations. In one camp, at least, the experiment was tried, with certain organizations, of balancing, with these data as one consideration. Such a use of the data grew in importance in the succeeding period of the psychological service. In the present discussion of the problem we shall aim mainly to show by a few representative samples the type and degree of inequalities found.

In the material here presented our interest is mainly in comparisons inside the larger units already discussed. It follows naturally, from the differences which have been found to exist between camps, that extreme discrepancies could be demonstrated by comparing regiments from a superior camp with those from an inferior. These we do not wish to stress at this point, although it should be remembered that they might contribute in important measure to the unevenness of the line when divisions are side by side at the front, instead of being widely separated from one another by the geographical locations of the various camps.

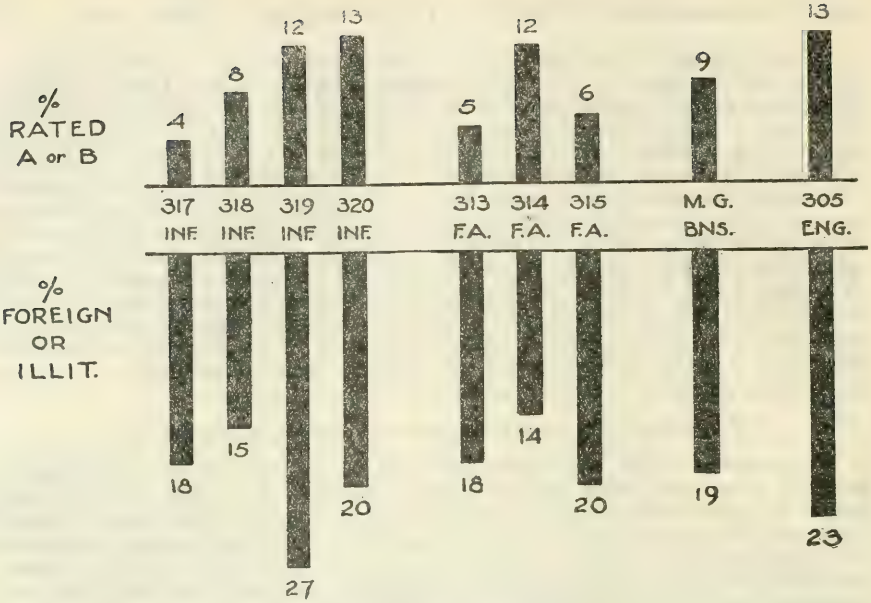


FIG. 5. Inequality of regiments. Eightieth Division.

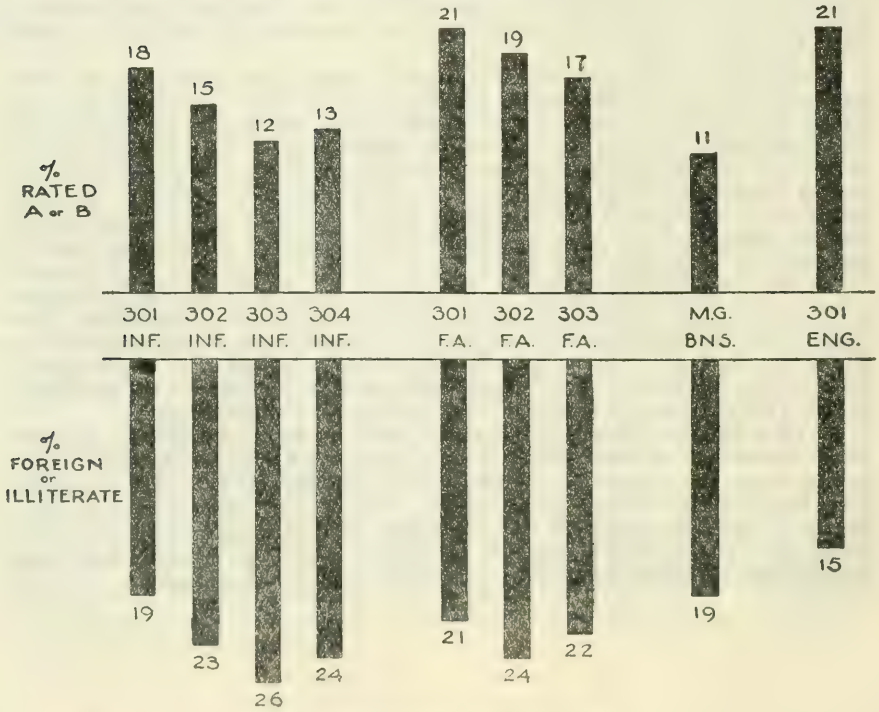


FIG. 6. Inequality of regiments. Seventy-sixth Division.

We have even less interest, at this point, in calling attention to differences between regiments of different branches of the service. If it is desirable that there be different standards for different branches it would follow that differences in the units of the several branches must exist. They should not, therefore, be thought of as contributing to inequality or unevenness in the sense that we are here considering.

Table 149 presents data concerning the main regimental units of the four divisions. In the light of the foregoing statement it is evident that irregularities of the type we are discussing may be observed by intercomparisons (1) of Infantry regiments and (2) of Artillery regiments in the several groups. In making such comparisons it has proved especially illuminating to call attention to two elements of the whole—i. e., the men making A or B grades, distinctly superior cases mentally, and the men eliminated as relatively illiterate. The importance of having in each organization a fair percentage of superior men, able to assume responsibility and exercise leadership on occasion, or, lacking the necessary qualities for leadership, at least competent to handle complicated paper work, is readily recognized. A regiment which contains as few as 4 or 5 per cent of such cases (see Table 149) would seem to have lost more than its margin of safety from this point of view. On the other hand, the relatively "illiterate," which have been shown by later experimentation to include a preponderance of cases of low-grade mentality, may seriously clog the machinery of the organization, especially if the organization does not require a large amount of work of the "laborer" type. Because of the obvious importance of these considerations graphic presentation such as that of figures 5 and 6 has been found useful in demonstrating the existence of such inequalities in the various camps. They are offered here as illustrative of the differences which may exist between regiments of the same branch in the same division.

The same point might be brought out by use of measures of central tendency—the mean or the median. Reference to table 149 shows the existence of varibility as thus measured.

TABLE 149.—*Comparison of regiments, by camps, showing percentages relatively illiterate, percentages grading A or B, and mean scores in examination a—Enlisted men (white).*

1. CAMP DEVENS (SEVENTY-SIXTH DIVISION).

Organization.	Number of cases.	Percentage eliminated as illiterate.	Percentage A or B.	Mean score.[1]
Infantry:				
301	2,328	18.6	18.2	193.3
302	2,437	22.7	14.7	186.0
303	2,652	26.4	12.4	175.9
304	2,054	23.9	12.6	175.5
Field Artillery:				
301	1,060	20.6	21.2	195.1
302	1,051	23.7	18.8	208.7
303	1,342	21.5	16.7	174.8
Machine Gun Battalion	1,406	19.2	11.0	166.5
Engineers, 301	1,280	15.0	20.6	184.9

2. CAMP DIX (SEVENTY-EIGHTH DIVISION).

Infantry:				
309	1,354	13.6	17.0	177.5
310	960	4.4	23.3	188.6
311	1,679	14.4	15.2	174.7
312	960	6.9	17.2	177.1
Field Artillery:				
307	639	4.5	27.5	204.4
308	833	3.7	16.9	175.1
309	604	4.0	18.7	178.9
Machine Gun Battalion	741	10.4	13.2	166.1
Engineers, 307[2]	372	10.0	18.6	176.4

[1] The mean score has been obtained for those who actually took examination *a*, after elimination of relative illiterates. For reasons already discussed, therefore, these values are only comparable within camps, not from camp to camp.

[2] For more complete data on this organization see table 8. The engineers therein reported represent the total Three hundred and third so far as it was examined.

TABLE 149.—*Comparison of regiments, by camps, showing percentages relatively illiterate, percentages grading A or B, and mean scores in examination a—Enlisted men (white)*—Continued.

3. CAMP LEE (EIGHTIETH DIVISION).

Organization.	Number of cases.	Percentage eliminated as illiterate.	Percentage A or B.	Mean score.
Infantry:				
317	3,014	18	4	114.4
318	2,838	15	8	135.6
319	2,286	27	12	160.7
320	2,312	20	13	159.4
Field Artillery:				
313	1,088	18	5	120.2
314	1,044	14	12	153.2
315	1,329	20	6	129.4
Machine Gun Battalion	1,066	19	9	152.1
Engineers, 305	972	23	13	165.4

4. CAMP TAYLOR (EIGHTY-FOURTH DIVISION).

Infantry:				
333	2,050	9.1	9.2	152.8
334	1,484	2.6	22.5	193.7
335	1,428	2.2	9.9	157.4
336	1,030	11.4	5.7	130.6
Field Artillery:				
325	512	.2	16.0	181.1
326	646	4.6	9.1	154.5
327	662	.3	16.1	179.8
Machine Gun Battalion	954	5.0	11.0	163.1
Engineers, 309	858	1.5	27.4	196.5

Even more striking differences were found to exist among the companies of certain regiments, as illustrated by tables 150 and 151 and by figures 7, 8, 9, and 10. Illustrations might have been picked from any branch of the service and any camp, though the amount of inequality varies markedly in different regiments. In table 150 (1) and (2) the percentages of superior (A and B) cases and of relatively "illiterate" are shown for the separate companies of infantry regiments, two from the Seventy-sixth Division and two from the Eightieth.[1] These two divisions are chosen as representing quite different levels of mental ability, and also because the examining was sufficiently complete at these two camps so that the data show approximately the full strength of the units at the time these reports were made. Figures 7 and 8 present graphically the data for the two infantry regiments from the Eightieth Division. It will be noted that these offer two quite different pictures. The inequalities of the Three hundred and nineteenth (fig. 7) are more striking since they appear both in the percentages of superior men and in the percentages of illiterate. The differences between the Companies A and E on the one hand and C and M on the other needs no comment. In the Three hundred and seventeenth, on the other hand, no such striking differences appear, the chief irregularities appearing in the percentages classed as illiterate. The low level of this regiment as a whole, as indicated in figure 8, shows itself again in the relatively low percentages of superior cases in all the companies. The problem confronting the officers of a company such as Company F, with one-third of its number illiterate, even by the relatively lenient standards of literacy used at Camp Lee, and only 1.2 per cent (three men) of A or B grade, is obvious. It is understood that use was made of such data as is here shown for making readjustments in this regiment. It should be expected, therefore, that such extreme cases would not appear in the final form of the regiment.

[1] In considering these tables and the accompanying figures the fact of difference in function in case of the machine gun, the headquarters, and the supply companies should be remembered. Balancing should not be expected to eliminate differences which reflect differences in function. On the other hand, it might be used to intensify these.

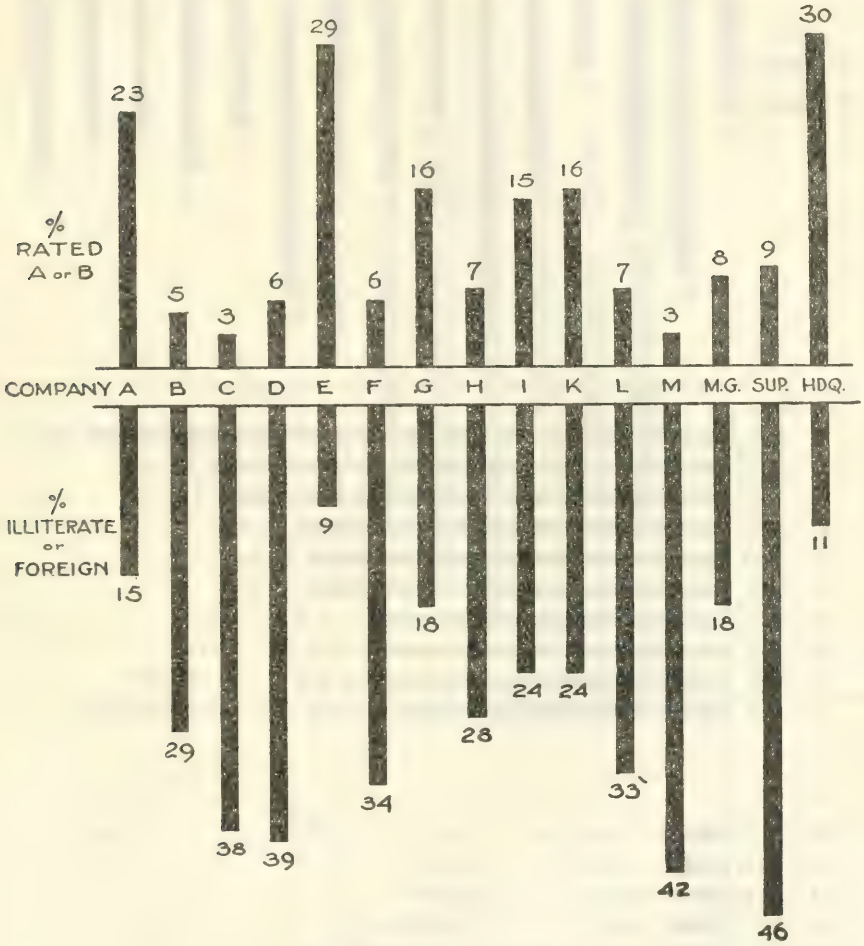


FIG. 7. Inequality of companies of an infantry regiment.

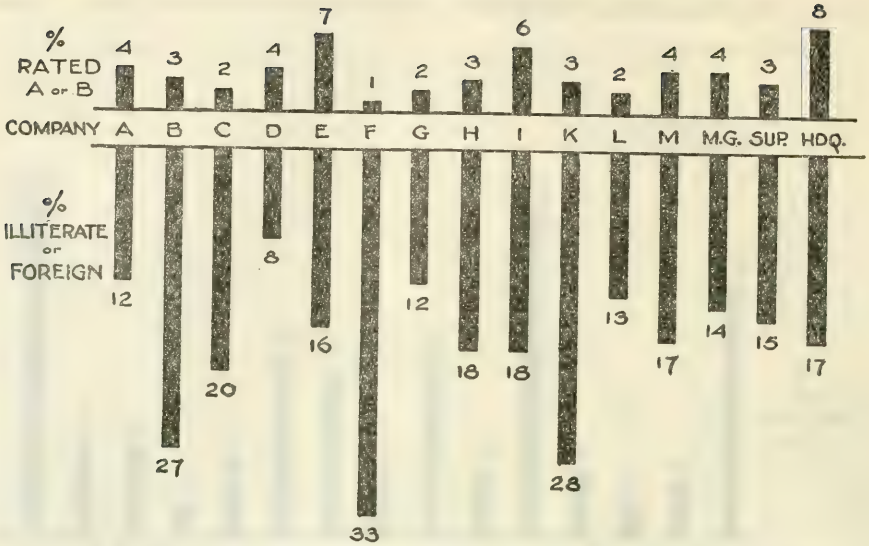


FIG. 8. Inequality of companies of an infantry regiment. Same division as regiment shown in fig. 6.

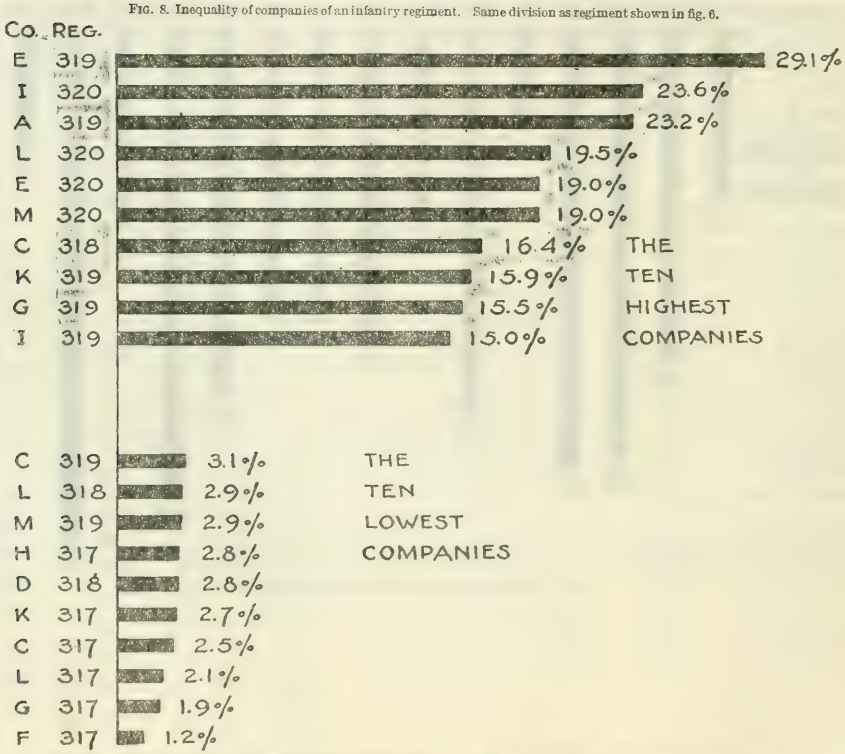


FIG. 9. Percentages of men of A or B grades found in the 10 best and the 10 poorest infantry companies of one division.

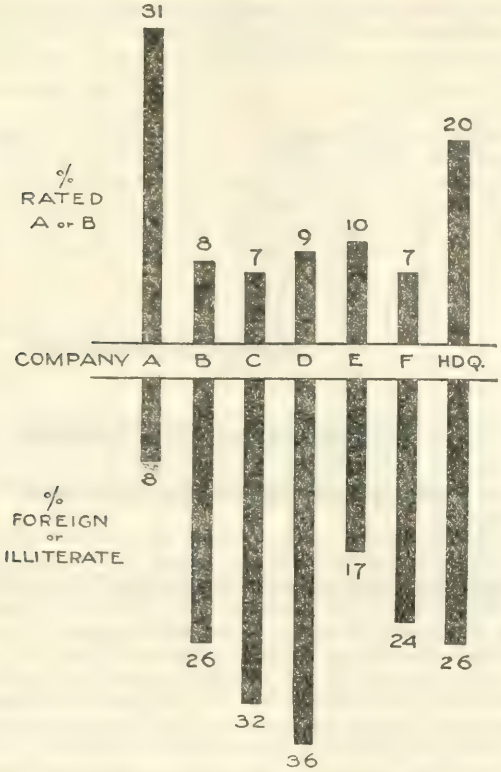


FIG. 10. Inequality of companies of an engineer regiment.

TABLE 150.—*Comparison of companies in four infantry regiments showing percentages relatively illiterate and percentages grading A or B in examination a—Enlisted men (white).*

1. SEVENTY-SIXTH DIVISION.

Three hundred and first Infantry.				Three hundred and third Infantry.			
Company.	Number of cases.	Percentage eliminated as "illiterate."	Percentage, A or B.	Company.	Number of cases.	Percentage eliminated as "illiterate."	Percentage, A or B.
A	178	19.7	17.4	A	205	28.8	7.3
B	197	[illegible]	25.5	B	206	16.5	18.5
C	170	36.5	13.5	C	125	28.8	14.4
D	191	33.4	24.2	D	188	26.6	12.2
E	170	15.9	23.5	E	195	26.1	10.8
F	188	11.7	20.7	F	186	31.2	12.4
G	2[illegible]2	22.3	13.9	G	148	22.2	16.2
H	191	5.2	23.0	H	201	30.3	15.9
I	257	27.2	15.2	I	221	32.6	10.3
K	205	11.1	9.3	K	242	22.2	14.2
L	1[illegible]	16.7	18.9	L	198	24.7	8.1
M	[illegible]	28.5	18.4	M	184	28.2	12.5
Machinegun	23	34.1	0	Machinegun	136	23.5	14.0
Headquarters	122	[illegible]	7.4	Headquarters	115	28.7	15.7

TABLE 150.—*Comparison of companies in four infantry regiments showing percentages relatively illiterate and percentages grading A or B in examination a—Enlisted men (white)*—Continued.

2. EIGHTIETH DIVISION.

Three hundred and seventeenth Infantry.				Three hundred and nineteenth Infantry.			
Company.	Number of cases.	Percentage eliminated as "illiterate."	Percentage, A or B.	Company.	Number of cases.	Percentage eliminated as "illiterate."	Percentage, A or B.
A	249	11.7	4.0	A	242	15.3	23.2
B	271	27.3	3.3	B	243	29.2	4.9
C	276	20.3	2.5	C	193	37.9	3.1
D	246	8.5	4.5	D	158	39.2	5.7
E	253	15.8	7.5	E	230	8.7	29.1
F	231	32.6	1.2	F	247	33.6	5.6
G	265	11.8	1.9	G	246	17.5	15.5
H	253	18.1	2.8	H	242	28.4	7.4
I	285	17.7	6.0	I	194	23.7	15.0
K	236	28.4	2.7	K	213	23.9	15.9
L	236	12.7	2.1	L	216	33.0	7.3
M	235	16.7	4.3	M	237	42.5	2.9
Machine gun	177	14.1	4.0	Machine gun	114	18.5	7.9
Headquarters	281	17.1	7.8	Headquarters	161	11.5	29.8
Supply	142	15.5	2.8	Supply	96	46.0	9.4

Figure 9 shows the extreme differences which appear if we disregard regimental groupings and consider all the infantry companies of a division. The percentages of superior (A or B) men are here shown for the 10 companies ranking highest from this point of view and the 10 ranking lowest. The special companies—machine gun, headquarters, and supply—are not included in this comparison.

A single set of illustrations may serve to suggest the existence of irregularities in other branches. Table 151 gives data on two engineer regiments, one from the Seventy-sixth Division and one from the Eightieth. The latter, shown also in figure 10, is of special interest, since it is known that the information here shown was used in the balancing of the regiment. No data are available to show the status of the regiment after the evening-up process, but a year later an officer of the regiment, who has served with it overseas, expressed his opinion to the effect that the efficiency of the regiment had been markedly increased by the change.

One of the most important contributions of the fall work was the clear demonstration of the existence of such marked inequalities within units, and the presentation of the information in such form that it could be used readily by the appropriate military authorities. Following the lines suggested in the fall, extensive use was made of such material during the later period of the psychological examining.

TABLE 151.—*Comparison of companies in two engineer regiments showing percentages relatively illiterate and percentages grading A or B in examination a.*

Three hundred and first Engineers, Seventy-sixth Division.				Three hundred and fifth Engineers, Eightieth Division.			
Company.	Number of cases.	Percentage eliminated as "illiterate."	Percentage, A or B.	Company.	Number of cases.	Percentage eliminated as "illiterate."	Percentage, A or B.
A	203	16.7	17.2	A	178	8.0	31.0
B	126	17.5	18.3	B	188	26.0	8.0
C	200	12.5	22.0	C	178	32.0	7.0
D	204	10.8	26.4	D	174	36.0	9.0
E	195	14.9	20.0	E	174	17.0	10.0
F	213	15.5	18.8	F	182	21.0	7.0
				Headquarters	91	26.0	20.0

SECTION 6.—*Comparison in terms of military status.*

Thus far we have been concerned with comparisons of groups of enlisted men distinguished from one another in various ways not involving an initial assumption of superiority of one group over another. In the present section we shall compare groups classified in terms of their military advancement. There are available for consideration from this point of view data on the follow-

ing types of groups: (1) Noncommissioned officers, (2) officers, (3) candidate officers in officers' training camps. The data on the first of these groups were incomplete; for the latter two groups, officers and officers' training camps, a representative survey was made.

DATA ON NONCOMMISSIONED OFFICERS.

Information regarding noncommissioned officers was difficult to obtain, since the majority of these at the time of the examination were only acting corporals or sergeants and not permanent appointments. At Camp Taylor, however, where examining was done late, records were obtained for 243 corporals and 196 sergeants, picked at random from the various groups examined. Table 152 and figure 11 show the data on this group in comparison with the whole body of Taylor enlisted men on the one hand and the officer group on the other.

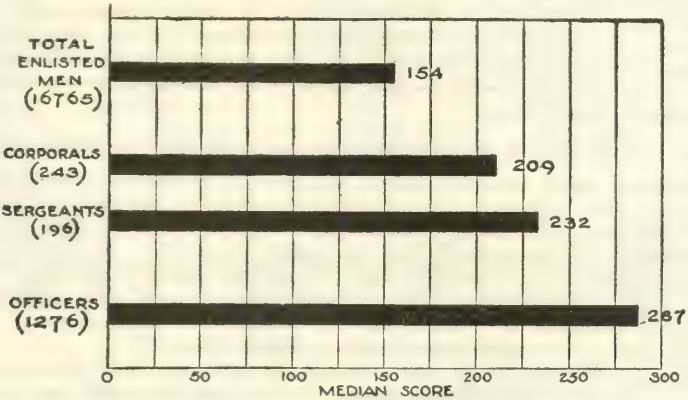


FIG. 11. Medians for enlisted men, corporals and sergeants, and officers, Camp Taylor. Number of cases shown by numbers in parentheses; numerical value of medians by numbers beside bars.

TABLE 152.—*Percentage distribution of scores of enlisted men, corporals and sergeants, and officers—Examination a—Camp Taylor.*

Score.	Grade.	Enlisted men.	Corporals.	Sergeants.	Officers.
350–414	A	0.5	0.4	2.0	8.1
300–349		4.4	10.7	12.3	32.5
250–299	B	9.5	16.4	27.5	31.5
200–249	C+	15.7	28.8	22.0	18.7
150–199	C	21.6	20.1	16.8	6.9
100–149	C−	21.3	16.0	12.8	2.1
50– 99	D	14.4	4.9	6.1	0.2
0– 49	E	5.0	2.5	0.5	.....
Eliminated as "illiterate"	.....	7.4	.....	.....	.....
Number of cases	.....	16,765	243	196	1,276
Median (Md)	.....	154	209	232	287
Upper quartile (Qu)	.....	216	260	276	319
Lower quartile (Ql)	.....	.....	154	168	215
Quartile deviation (Q)	.....	(*62)	53	54	37
Percentage A or B	.....	14.5	27.5	41.8	72.1

* Since cases eliminated from examination *a* as illiterate are included in this total group the lower quartile could not be obtained. The figure given for the quartile deviation in case of the enlisted men represents the range from the upper quartile to the median—an approximation to Q.

The standing of the two noncommissioned groups as mentally superior to the total group from which they are drawn, but as inferior to the officer group, is clearly indicated by these data, as is also the superiority of the group of sergeants to that of corporals. In other words, the mental status of the group as a whole, as determined by these examinations, parallels their military status as determined by practical military considerations. For this group the appointments had not been influenced in any way by the psychological examinations, since the nec-

essary information was not available to their officers at the time warrants were issued. The importance of securing early returns from the psychological examinations and putting these at the disposal of the company officers for their reference in connection with appointments follows from these findings. The further problem which suggests itself is that concerning the extent to which the selection might have been improved by judicious use of the psychological results, especially by reduction in the number of low-grade cases. This problem was not followed up until the later period of psychological examining. In the light of later evidence the proportion of C−, D, and E cases in these two groups seems over large.

It is further important to remember the actual relationship between the noncommissioned officer group and the commissioned officers—the fact that appointment to the former rank may be a step toward the latter. The noncommissioned officer group should therefore contain much potential officer material. This relationship is illustrated by data from Camp Devens on a special group of 176 sergeants who were admitted to officers' training camp. For this group we find 74.4 per cent of A or B cases, only 1.1 per cent of C− cases, and none of lower grade, and a median score of 291. These show a distinct superiority to the random selection of sergeants reported above, indicating the selection of picked members of the noncommissioned group for officers' training camp.

DATA ON OFFICERS AND ON CANDIDATE OFFICERS IN OFFICERS' TRAINING CAMPS.

Comparison of enlisted men with officers is made possible by extensive data obtained from the four camps. The importance of this material can hardly be overestimated for its bearing on the possible usefulness of psychological examining in the Army. During the fall the psychological methods were still under trial. Their serviceability, especially in connection with officer groups and prospective officer material, had not been fully established, in spite of the clear indications of the summer tryouts with various other types of groups. The results of the fall trial demonstrated beyond any question that the psychological examinations were able to differentiate between officers and enlisted men in striking fashion.

A natural corollary of this fact was the idea of the usefulness of such data in connection with selection of men for officers' training camps. It would seem an obvious waste, of no small moment under the pressure of war needs, to send for training men whose mental caliber is definitely inferior to the standards for officers as indicated by existing Army practice. It may very well be true that the training school itself is a sufficient sieve to prevent any man who is below par from coming through to a commission, but it would seem highly undesirable that an unnecessary number of such cases should be admitted to the school. A survey of 22 officers' training camps of the third series was undertaken in January, 1918, with a view to determining the caliber of the men admitted to these schools.

The results obtained from examination (1) of officers and (2) of men admitted to officers' training camps are presented herewith in comparison with data on enlisted men. Intercomparison of the various subgroups within each of these groups will be discussed in a later section.

Officers.—Considering, first, the comparison of officers with men we note that differences are so marked in degree that it is practically immaterial what basis of comparison we use, what specific groups of officers and of men we compare, and whether allowance is made for the presence of the relatively illiterate in the group of enlisted men or not. The latter point affects slightly the degree of difference shown between the groups, since the officer group loses no cases by elimination for illiteracy, but entire disregard of this fact can not obscure the difference between the groups. The accompaying graphs present the comparison in a variety of ways and require little comment or explanation.

Figure 12 shows the distribution, by examination *a*, of enlisted men from the four camps in comparison with that of officers. Distances along the abscissæ are divided into rough units (50 points in examination *a*), which correspond in the main to the letter grade groups. It may be noted here that it was considered an important matter, in camp practice, to hold for the most part to such rough groupings to counteract the tendency to ascribe importance to fine

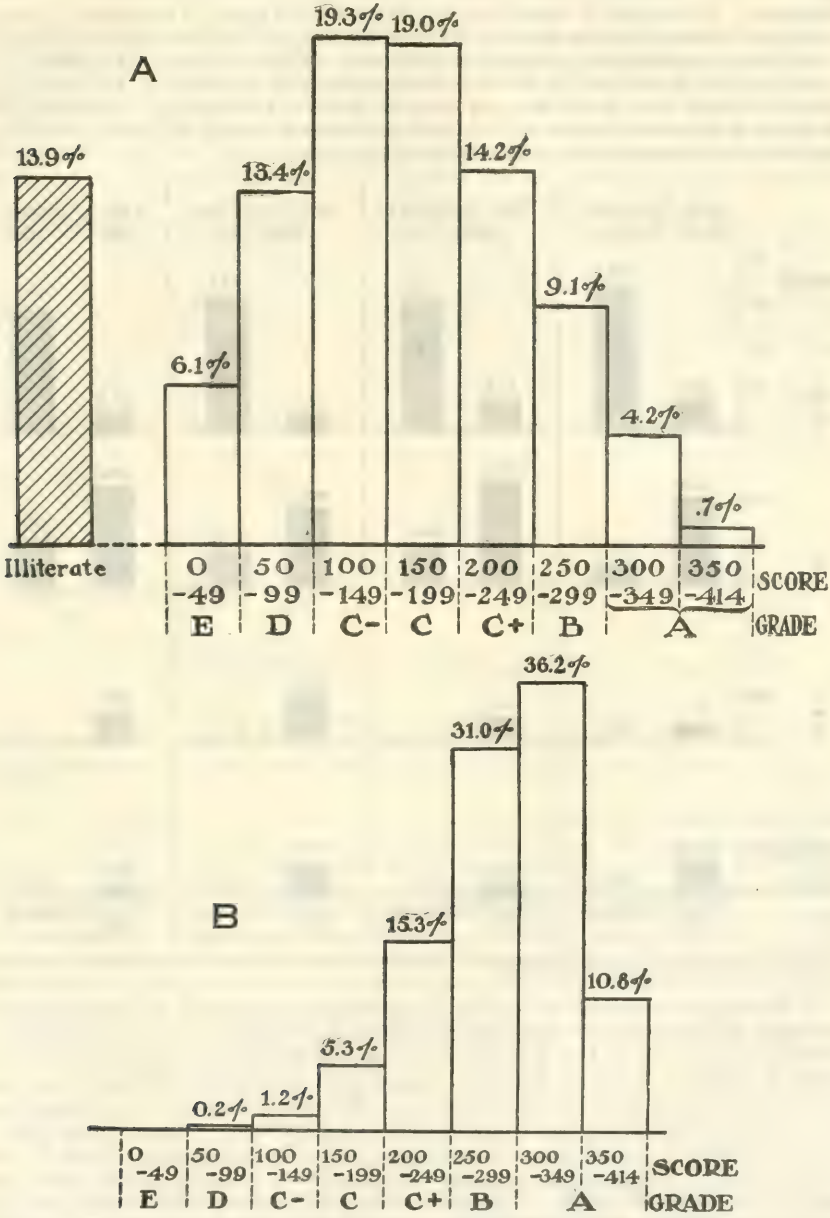


FIG. 12. Percentage distributions examination *a*: All four camps. A, enlisted men, 65,267. B, officers, 5,563.

distinctions. The massing of officers above 250, in the A and B grades, is noteworthy by virtue of the sharp contrast with the distribution for enlisted men, which shows its greatest massing in the C groups, especially in the range from 100 to 200. Of the officers who fall in the C group the majority fall above 200. It should be noted further that the existence of a well-defined difference between these groups does not imply the absence of overlapping. Fortunately for the future of the service, the group of enlisted men received through the draft shows representatives over the whole range covered by the officer group.

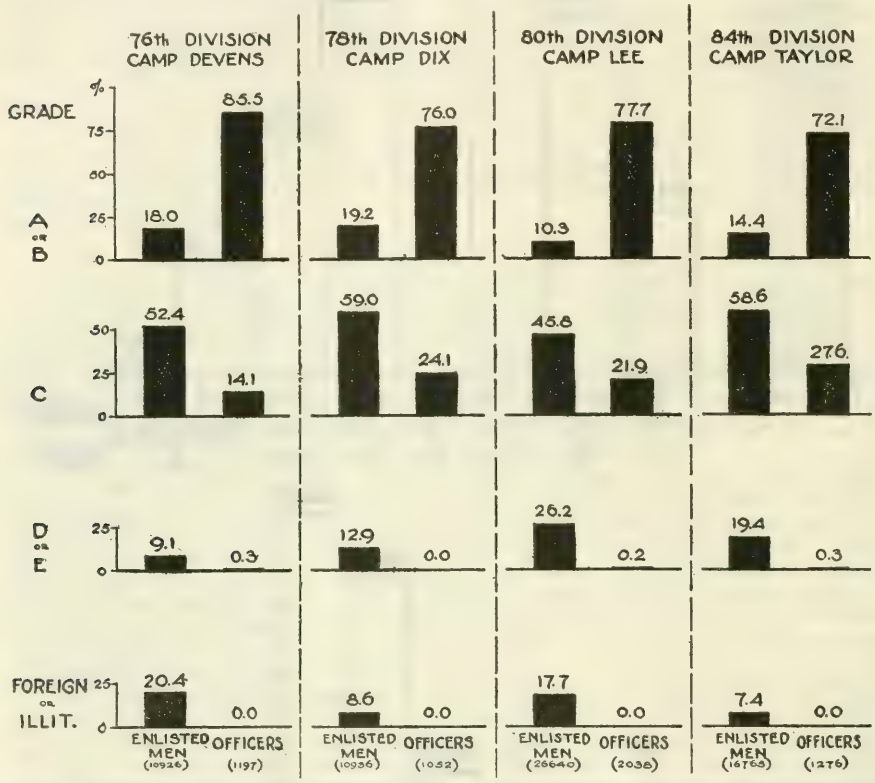


FIG. 13. Percentages of officers and of enlisted men making (1) A or B grades, (2) C grades, (3) D or E grades, and (4) eliminated on the ground of illiteracy. Numbers in parentheses show numbers of cases.

A still rougher comparison of these two groups is presented in figure 13. This shows, for each camp, the percentages of officers and of enlisted men making (1) A or B grades, (2) C grades (C+, C, or C−), (3) D or E grades, and (4) men eliminated from examination *a* on the ground of illiteracy. The above distinction centers about the significance of the C group as most representative of the whole class of privates. The characterization of C as designating the "private type," or the typical private, based first on the preliminary summer investigation, is further justified by the fall data showing that the mean, the median, and the mode for enlisted men are in C, and that over 50 per cent of the cases fall in this class. The accompanying figure, therefore, shows the relative numbers *above*, *below*, and *in* the class of the average enlisted man, and also the numbers in the additional, somewhat indeterminate group of the relatively

illiterate. It is evident that all camps tell the same story, regardless of whether the camp in question is of relatively high or low caliber, showing the preponderance among the officers of men "superior to the average," the small proportion of men of the level of the "average private," and the negligible number falling below this level.

Figure 14 shows the median score for enlisted men in comparison with the median for officers. The main bars represent medians of the totals from the four camps; the dotted lines the medians of the separate camps. It is apparent that the superiority of the officer group over the enlisted men is not affected by the existing variations among camps.

The foregoing comparisons have been made between officers and total groups of men, including illiterates. It is possible to make more detailed comparisons by using only those of the latter group who took examination *a*, disregarding illiterates. Figures 15 and 16 show distributions of scores, by intervals of 10, for officers and men. Figure 15 gives the percentage distribution for each group; the solid line represents the distribution of men and the dotted line that of officers. The superiority previously noted in favor of the officers is fully as evident here as in the rougher diagrams.

Figure 16 shows the same two groups drawn not to a percentage scale but to a common scale for number of cases. The relative numbers included in the two groups are therefore

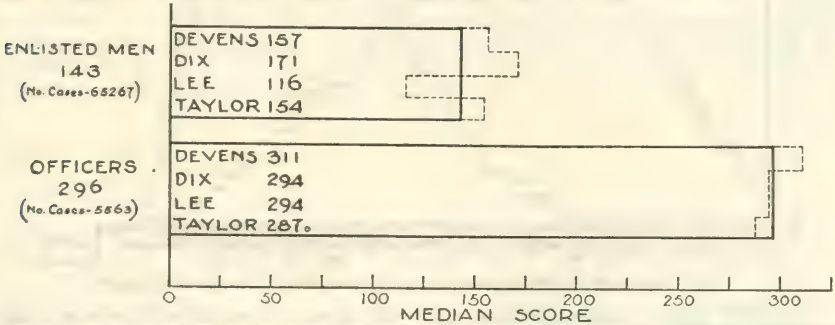


Fig. 14. Medians for enlisted men and for officers. Main bars represent data for four camps combined. Dotted lines represent data for separate camps.

proportional to the areas covered by the two curves. This comparison is important as showing that it is possible to find, within the group of enlisted men at these four camps, a body of men of the same range of intelligence as the officer group shown, and with as many cases at each level. The existence of such a group is important as indicating the presence of future officer material in the body of enlisted men received through the draft, though the proportions as here shown are not intended to represent the normal proportions of officers to men in the Army. They show merely the numbers of both groups actually examined during this period. Since the officer group was more completely examined than the group of enlisted men, the officers are present here in more than their usual proportions.

Reference to the means for officers and enlisted men shows the same striking differences that other comparisons have brought out:

Mean, enlisted men, 168.7 ± 0.21.

Mean, officers, 288.6 ± 4.82.

We note also a difference between the standard deviations of the two groups:

Standard deviation, enlisted men, 79.

Standard deviation, officers, 53.3.

The dispersion of the enlisted men is clearly wider than that of the officers. This difference in dispersion was, in fact, apparent from figures 15 and 16, which show the enlisted men covering

a much wider range than the officers, containing representatives in the highest classes of the latter group as well as over an extensive range below their lower limit.

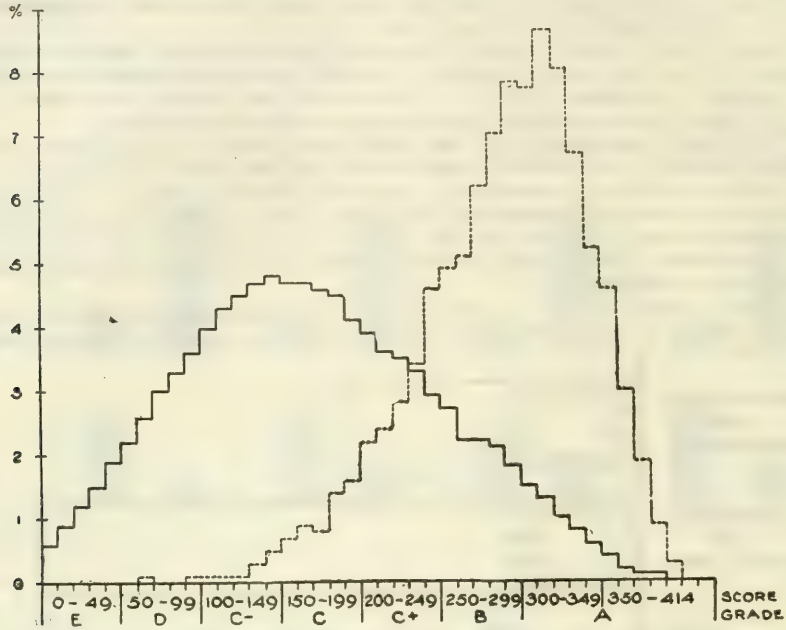


FIG. 15. Percentage distributions in examination *a*: All four camps. Officers, 5,563. Enlisted men, 63,647.

Candidate officers in officers' training camps.—The group of men picked for officers' training camps presents a situation of rather special interest. Selections for the third series were made

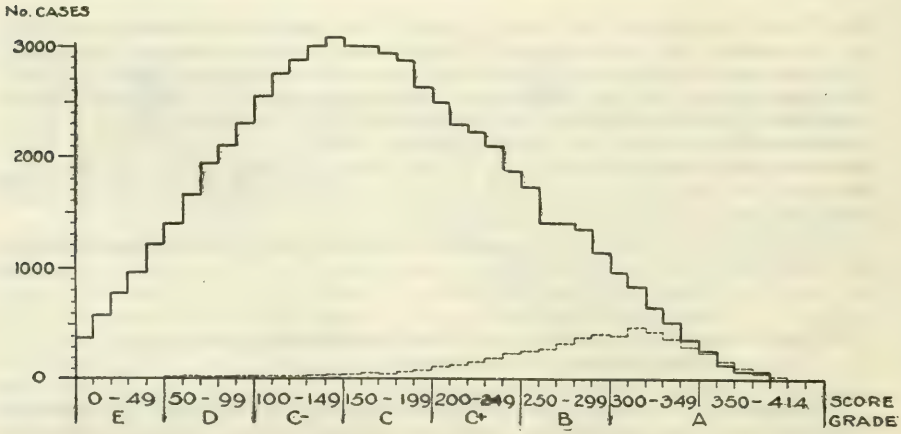


FIG. 16. Distributions of officers and of men in examination *a*. Drawn to numerical scale. Same group as in fig. 14.

mainly from the body of men already in the Army. They constitute a selection toward the group of officers, but a selection which may vary within wide limits of effectiveness, depending both

on the caliber of the specific group from which the men were picked and on the skill and judgment of the officers making the choice. We shall see in a later section that there is wide variation between the camps in the general character of their groups, depending, doubtless, on both factors. It should be remembered also that the men here shown do not represent the final

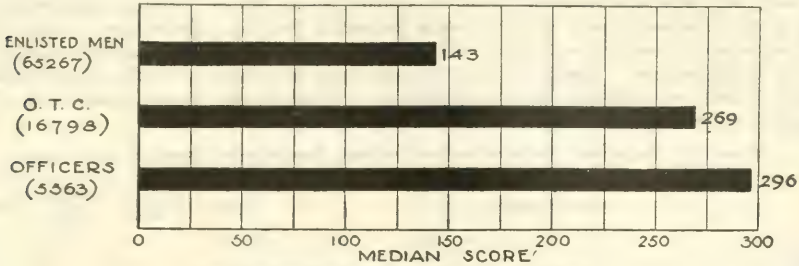


FIG. 17. Medians for enlisted men, candidate officers, and officers.

choice. There is further pruning in the schools to bring the groups up to officer level. For the training camps of the third series we have no information regarding the results of such pruning.

The data here offered represent results of examinations given to men in the Infantry and Artillery schools at 22 stations and to members of the Engineer officers' training school at Camp Lee, which drew from a large number of stations.

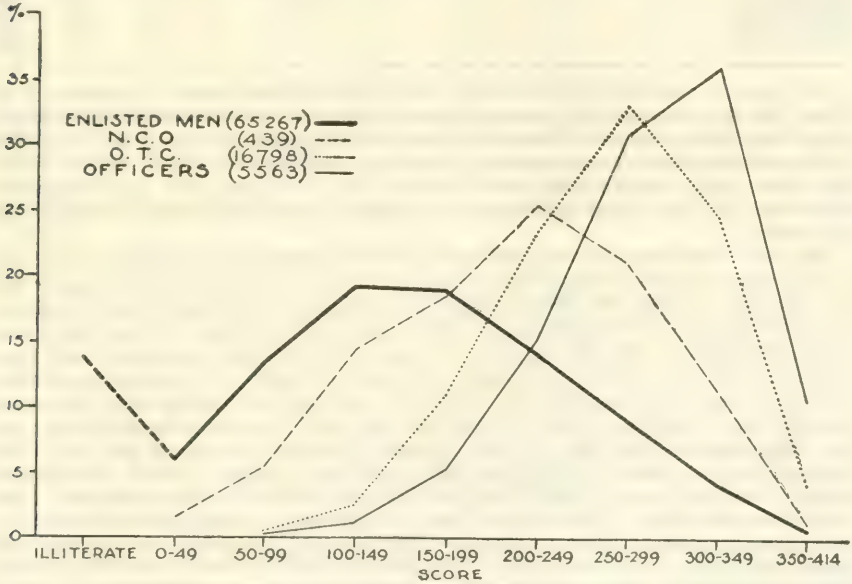


FIG. 18. Percentage distribution of enlisted men, noncommissioned officers, candidate officers, and officers. Note that "illiterates" for whom percentage is given in case of enlisted men do not properly fall on scale of abscissæ.

Table 153 gives the main data necessary for rough comparison of the three groups—enlisted men, candidate officers in officers' training camps, and officers. Figures 17 and 18 present the differences between these groups graphically.

Figure 17 shows the relationship between the medians of the three groups. According to this it appears that the candidate officers fall between the other two groups, but approximate

much more closely to the officers than to the enlisted men from whom they were chosen. In connection with the medians it is of interest to note the quartile deviations of the three groups given in table 153. (As previously explained, the range from the upper quartile to the median is used as approximately equivalent to the quartile deviation in the case of the enlisted men, whose group includes illiterates.) It will be noted that the officers' training camp group, like the group of officers, has a much narrower dispersion than the enlisted men—a fact which follows naturally from the tendency to select the officer candidates from the upper portion of the group of enlisted men. Again, the fact of the slightly greater dispersion of the officers' training camp students as compared with the officers leaves room for the further constricting of the group to officer proportions by pruning.

TABLE 153.—*Comparison of data on enlisted men, candidate officers in officers' training camps, and officers.*

Score in examination *a*.	Grade.	Enlisted men.	Officers' training camps.	Officers.
350–414	A	0.7	4.3	10.7
300–349		4.2	24.8	36.2
250–299	B	9.1	33.2	31.0
200–249	C+	14.2	23.6	15.4
150–199	C	19.0	10.9	5.3
100–149	C−	19.3	2.6	1.2
50–99	D	13.4	.4	.2
0–49	E	6.1	.....	.....
Eliminated as illiterate	.....	13.9	.....	.....
Number of cases	.....	65,267	16,798	5,563
Median	.....	143	269	296
Upper quartile (Q_3)	.....	212	306	327
Lower quartile (Q_1)	.....	.....	227	259
Quartile deviation (Q)	.....	(69)	40	34
Percentage above 300	.....	4.9	29.1	46.9
Percentage above 250	.....	14.0	62.3	77.9
Percentage below 200	.....	71.7	13.9	6.7

In figure 18 are shown the percentage distributions of these groups by intervals of 50 points. For this comparison we have added also the curve for noncommissioned officers examined at Camp Taylor, summarized from the figures on corporals and sergeants given in table 152. It is obvious that we have here an ascending series from enlisted men to officers, with the candidate officers again approximating most closely to the officer group, the noncommissioned officers next, and the enlisted men lowest but extending over the whole range covered by the other groups.

Not only was it important to point out the fact of difference between these groups, but from the practical point of view of future recommendations for officers' training camps it was also important to locate the dividing lines which distinguish the groups in most significant fashion. Figure 19 shows the percentages of the various groups falling above and below each of three dividing lines—300, 250, and 200. These give, above the line, respectively, the A men, the A and B men, and the A, B, and C+ men. The relative position of the three groups remains the same wherever the division is made. It will be noted that the dividing line of 300 almost eliminates from consideration the body of enlisted men, only 4.9 per cent appearing above the line. Since, moreover, this line of division selects out slightly less than 50 per cent of the officer group, an A grade is obviously too high a standard to expect of officer candidates in general. The A and B grades together include over 75 per cent of the officer group and 14 per cent of the drafted men. There is thus a fairly extensive group available from which further selection can be made for officers' training, allowing choice with reference to other qualities than general intelligence. The dividing line of 200 offers a still more conservative requirement. Over 90 per cent of the officers and almost 30 per cent of enlisted men surpass this level. There is thus an abundant field for choice from among the drafted men having the degree of intelligence here suggested.

It was urged by the psychologists, as a conservative recommendation, that men falling below 200 in examination *a* be scrutinized with the utmost care before admission to officers' training camps, in order to determine whether they possess in unusual measure other qualities necessary for an officer, especially qualities of leadership and initiative.

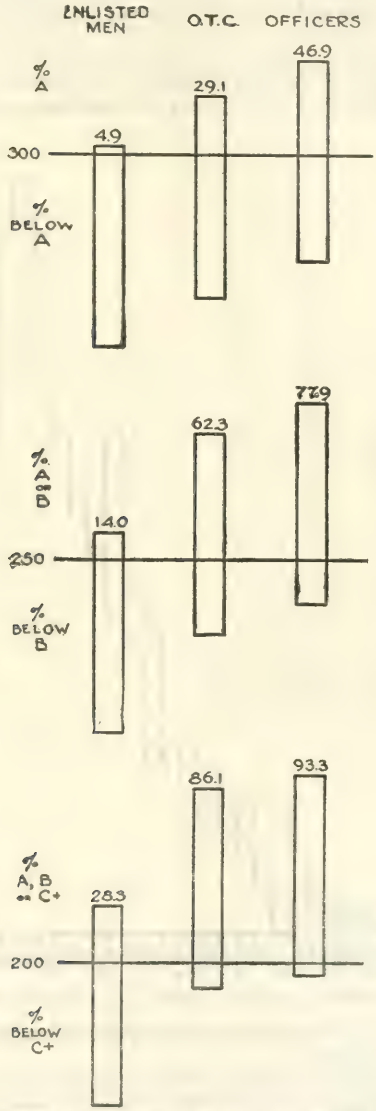


FIG. 19. Percentages of enlisted men (65,267), candidate officers (16,798), and officers (5,563) falling above and below various dividing lines.

Table 154 gives more detailed distributions and constants for certain groups of candidate officers in comparison with closely related officer groups. For this purpose the training camps of two stations (Camp Devens and Camp Taylor) are shown in relation with officers at these same camps. Similarly the students in Engineer officers' training camp at Camp Lee, which drew from a considerable number of camps, are shown in comparison with the Engineer officers from all four camps. Figure 20 presents graphically the data on the two groups from Camp Devens. In all three combinations here shown a slight difference in favor of the officer group

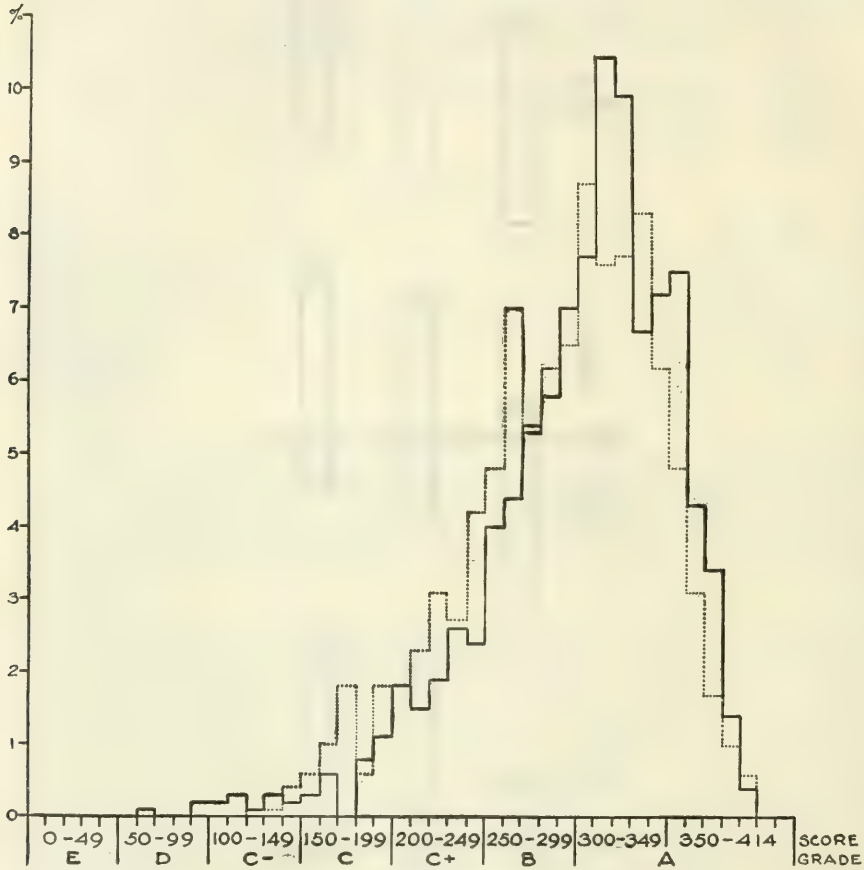


FIG. 20. Percentage distributions of officers (——) and officer candidates (.....), Camp Devens. Officers, 1,147; officer candidates, 799.

is indicated. Computing the probable errors of the differences between the means of the several groups gives the following results:

Difference of the means (Devens officers *v.* Officers' training camp) = 6.6 P. E. $_{\text{Diff.}}$

Difference of the means (Taylor officers *v.* Officers' training camp) = 2.6 P. E. $_{\text{Diff.}}$

Difference of the means (Engineer officers *v.* Engineer officers' training camp) = 6.7 P. E. $_{\text{Diff.}}$

If we consider that a difference is great enough to carry conviction regarding its significance when it is at least 4 times the probable error of the difference, it is evident that two of the above

comparisons meet this requirement, while the third (Camp Taylor officers *v.* Officers' training camp) is too small to be considered certainly valid. These groups, therefore, illustrate again the close approximation of the group of officer candidates to that of officers and the usual superiority of the latter.

TABLE 154.—*Detailed comparison of officers and officer candidates—Percentage distributions and constants—Examination a.*

Score.	Camp Devens.		Camp Taylor.		Engineer officers (4 camps).	Engineer officers training camp (Camp Lee).
	Officers.	Officers training camp.	Officers.	Officers training camp.		
400–414	.....	.....	.....	.....	0.3	0.1
390–399	0.4	0.6	0.3	.....	1.2	.....
380–389	1.4	1.0	.5	.....	1.5	.8
370–379	3.4	1.7	1.2	0.2	3.3	1.3
360–369	4.3	3.1	2.6	1.0	5.7	2.2
350–359	7.5	4.8	3.5	2.5	5.4	3.9
340–349	7.2	6.2	3.8	3.5	9.5	5.0
330–339	6.7	8.3	6.4	5.5	11.0	6.7
320–329	9.9	7.7	6.0	5.1	9.8	7.1
310–319	10.4	7.6	8.9	7.2	9.8	8.5
300–309	7.7	8.7	7.4	7.6	9.8	8.5
290–299	7.0	6.5	7.1	10.3	6.5	8.7
280–289	5.8	6.2	7.3	7.6	6.0	7.8
270–279	5.4	5.3	6.0	6.2	5.1	6.2
260–269	4.4	7.0	5.1	9.0	2.4	5.8
250–259	4.0	4.8	6.0	8.2	3.0	6.0
240–249	2.4	4.2	5.6	4.7	2.7	4.7
230–239	2.6	2.7	4.0	4.9	1.2	4.4
220–229	1.9	3.1	3.5	3.3	1.8	2.3
210–219	1.5	2.3	2.7	2.7	1.2	1.9
200–209	1.8	1.8	2.9	1.6	.3	1.4
190–199	1.1	1.8	2.4	1.8	.9	1.9
180–189	.8	.6	1.6	1.4	.6	1.4
170–179	.....	1.8	1.2	2.7	.....	1.3
160–169	.6	1.0	.9	1.0	.3	.5
150–159	.3	.6	.7	.2	.3	.6
140–149	.2	.4	.9	.6	.3	.2
130–139	.3	.1	.7	.2	.....	.3
120–129	.1	.1	.2	.....	.....	.3
110–119	.3	.....	.2	.....	.....	.1
100–109	.2	.....	.1	.4	.....	.1
90– 99	.2	.....	.....	.4	.3	.....
80– 89	.....	.....	.1	.....	.....	.....
70– 79	.....	.....	.....	.....	.....	.....
60– 69	.1	.....	.1	.....	.....	.....
50– 59	.....	.....	.1	.....	.....	.....
Number of cases	1,197	711	1,276	487	336	1,505
Mean ± P.E.$_M$	302.1 ±1.00	291.1 ±1.32	279.6 ±1.04	274.7 ±1.52	311.3 ±1.68	287.1 ±.867
σ	51.3	52.2	55.1	49.7	45.7	49.9

COMPARISON WITHIN THE OFFICER GROUP.

Analysis of the data regarding officers is less complicated than similar analysis of the various groups of enlisted men. This is largely due to the fact that there is no problem of segregation for illiteracy, and that, accordingly, the whole group can be measured by one method; in this case examination *a*. More exact comparison between groups (e. g., between camps or between branches) is therefore possible.

Comparison of camps.—Table 155 gives the percentage distribution of officers' scores by camps. The distribution for all four camps combined, given in the final column, has been shown graphically in connection with the distribution for enlisted men on page 507.

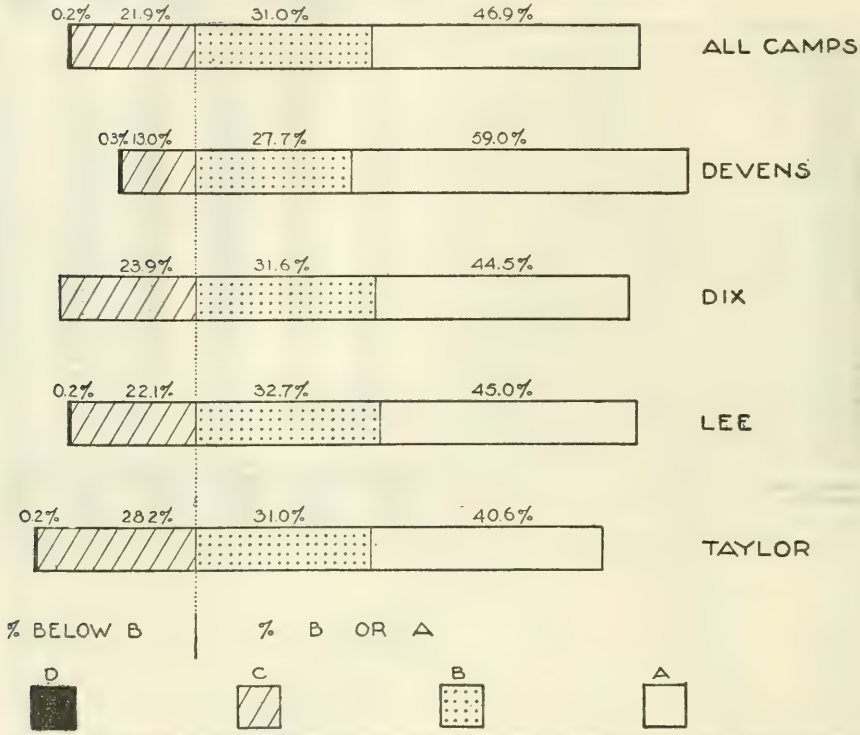


FIG. 21. Comparison of officers by camps, showing percentages in each letter grade. Officers: Total, 5,563; Devens, 1,147; Dix, 1,052; Lee, 2,038; Taylor, 1,276.

Figure 21 presents graphically the data of this table, summarized by letter grades. The various bars, representing the different camps, are divided into segments corresponding to the different grades. Since the A and B grades are considered peculiarly characteristic of officers, the bars are located with reference to the line separating the A and B grades from those below B. From the point of view of certain specific interests other dividing lines might obviously have been chosen. Considering, first, the proportions of A and B cases in each camp it is evident that the Devens officers stand out as superior to the other groups, and the Taylor officers as inferior, with the Dix and Lee groups falling between and differing only slightly from one another. Reference to percentages making A grades shows the same order of precedence, but differentiates the Devens officers from the other three more strikingly. Comparison with reference to percentages making C or above is valueless; the numbers falling below this level are negligible so that differences between groups are lost.

TABLE 155.—*Percentage distribution of scores by camps: Examination a—Officers (white).*

Score.	Devens.	Dix.	Lee.	Taylor.	All four camps.
400-409			0.1		[1] 0.0
390-399	0.4	0.2	.3	0.3	.3
380-389	1.4	.6	1.1	.5	.9
370-379	3.4	1.0	2.0	1.2	1.9
360-369	4.3	1.8	2.9	2.6	3.0
350-359	7.5	4.4	3.6	3.5	4.6
340-349	7.2	5.0	5.1	3.8	5.2
330-339	6.7	6.7	6.9	6.4	6.7
320-329	9.9	7.5	8.4	6.0	8.0
310-319	0.4	8.1	7.5	8.9	8.6
300-309	7.7	9.2	7.0	7.4	7.7
290-299	7.0	8.7	8.1	7.1	7.8
280-289	5.8	6.8	7.5	7.3	7.0
270-279	5.4	6.3	6.8	6.0	6.2
260-269	4.4	5.8	5.0	5.1	5.1
250-259	4.0	3.9	5.4	6.0	4.9
240-249	2.4	4.6	5.1	5.6	4.6
230-239	2.6	3.3	3.6	4.0	3.4
220-229	1.9	2.9	2.9	3.5	2.8
210-219	1.5	2.9	2.7	2.7	2.4
200-209	1.8	2.1	2.0	2.9	2.2
190-199	1.1	1.8	1.4	2.4	1.6
180-189	.8	2.3	1.0	1.6	1.4
170-179		1.0	.9	1.2	.8
160-169	.6	1.1	.9	.9	.9
150-159	.3	.9	.7	.7	.7
140-149	.2	.7	.3	.9	.5
130-139	.3	.1	.1	.7	.3
120-129	.1	.2	.1	.2	.1
110-119	.3	.1	.1	.2	.1
100-109	.2	.1	.1	.1	.1
90- 99	.2		[1] 0.0		.1
80- 89			[1] 0.0	.1	[1] 0.0
70- 79			[1] 0.0		[1] 0.0
60- 69	.1		[1] 0.0	.1	.1
50- 59				.1	[1] 0.0
0- 49					
Total	100.0	100.0	100.0	100.0	100.0
Number of cases	1,147	1,052	2,038	1,276	5,563

[1] Indicates less than 0.1 per cent.

The medians for the various stations are given in table 156 and show the same general relationship. The same order of precedence appears also in the means, given in table 157. For the latter the probable errors of the differences have also been computed in order to determine the significance to be ascribed to the apparent differences. Table 158 shows the ratio of the difference between any two means to the probable error of this difference. The Dix officers fail to be distinguished from either the Lee or the Taylor officers by a difference equal to four times the probable error. Accordingly the apparent differences between these groups can not be stressed. All other groups differ by decidedly more than four times the probable error. Since the degree of irregularity of procedure which existed in the examining of the enlisted men was not present for the officers we may, therefore, accept these differences as established.

It will be remembered that in all comparisons of enlisted men by camps, Lee ranked conspicuously low. It is of interest to note that its officers do not stand in this position with reference to the other camps. In fact the mean for the Lee officer groups is practically identical with that for all four camps.

TABLE 156.—*Comparison of officers by camps, showing medians, upper and lower quartiles, and quartile deviations—Examination a.*

	Devens.	Dix.	Lee.	Taylor.	All camps.
Median	311	294	294	287	296
Upper quartile (Q_3)	329	323	326	319	327
Lower quartile (Q_1)	274	253	255	245	259
Quartile deviation (Q)	28	35	36	37	34
Number of cases	1,197	1,052	2,038	1,276	5,563

TABLE 157.—*Comparison of officers by camps: Means and standard deviations—Examination a.*

	Devens.	Dix.	Lee.	Taylor.	All four camps.
Mean	302.1	284.7	288.3	279.6	288.6
± P. E. σ	±1.00	±1.09	±.78	±1.04	±.48
σ	51.3	52.3	52.4	55.0	53.3
Number of cases	1,197	1,052	2,038	1,276	5,563

TABLE 158.—*Comparison of officers by camps—Ratio of the differences between means to probable errors of differences.*

	Dix.	Lee.	Taylor.
Devens	11.7	10.8	15.6
Dix	.....	2.7	3.4
Lee	.....	.....	6.7

Comparison of branches.—Table 159 gives the detailed distribution of officers of certain main branches of the service. Figure 22 presents graphically these data summarized by letter grades for purposes of rough comparison. Again the dividing line between B and C has been

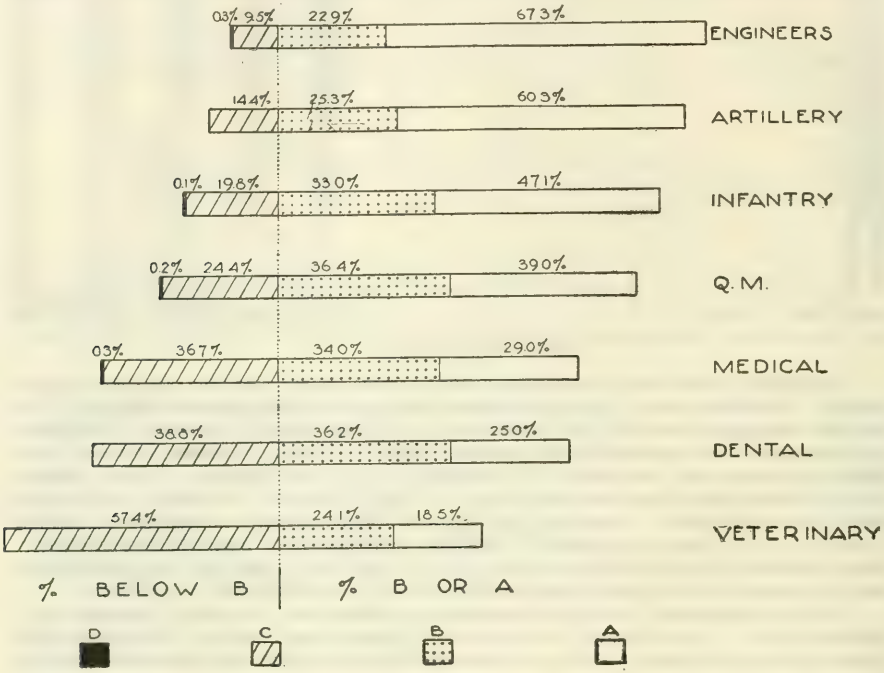


FIG. 22. Comparison of officers by branches, showing percentages in each letter grade. Branches from all four camps combined. Engineers, 336; artillery, 680; infantry, 2,050; quartermaster corps, 470; medical, 639; dental, 116; veterinary, 54.

stressed as most important. On this basis of comparison we find the various branches separated for the most part by quite distinct steps and arranged in the following order of excellence: Engineer, Artillery, Infantry, Quartermaster Corps, Medical Corps, Dental Corps, Veterinary Corps. The differences between the extremes of these groups are very striking. On the one hand, we note the engineer and artillery officers with 90.2 per cent of A and B grades and 85.6 per cent, respectively, and, on the other hand, the medical, dental, and veterinary corps with 63 per cent, 61.2 per cent, and 42.6 per cent, respectively. The same order of excellence appears if we consider only the percentages making A grades, though the disparity in favor of the highest groups is even more marked. Thus we find the engineer and artillery officers with 67.3 per cent and 60.3 per cent of A men, respectively, as contrasted with the medical, dental, and veterinary with 29 per cent, 25 per cent, and 18.5 per cent, respectively.

Table 160 and figure 23 give the medians for these groups showing the same order of excellence and the same type of marked difference between extreme groups. The medians for the various branches are given also by camps, indicated on the diagram by dotted lines. A fair amount of variability is evident between camps for any given branch. Nevertheless the general

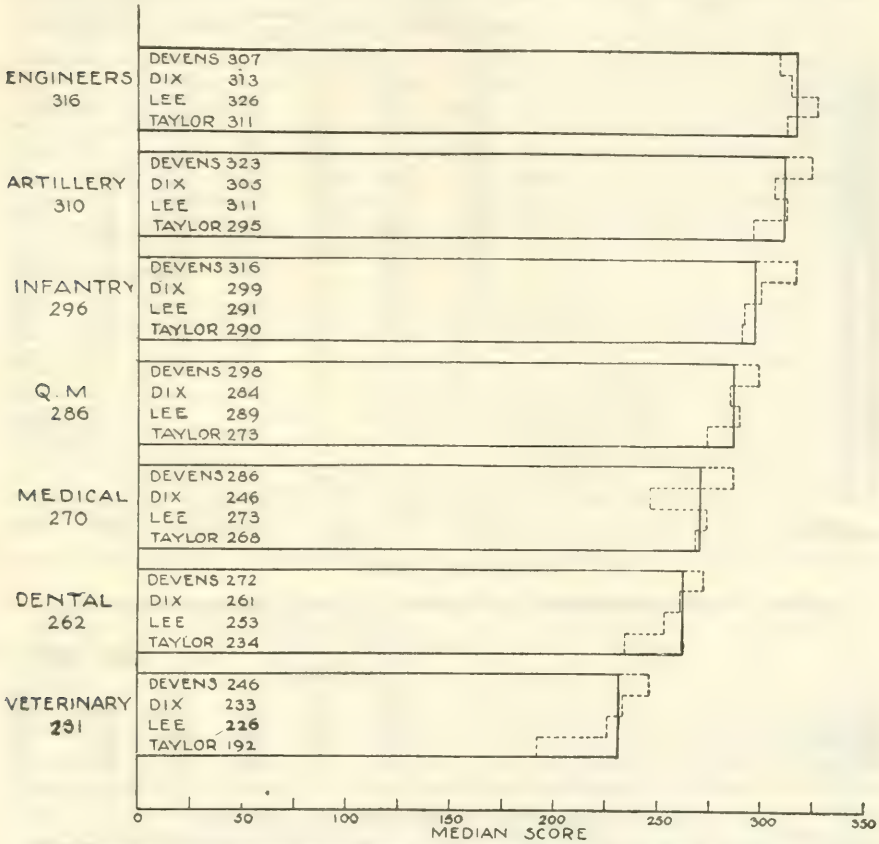


FIG. 23. Comparison of medians for various branches. Officers. Main bars represent medians for combined data from all four camps. Dotted lines represent medians for separate camps. Numbers show values of medians. (For numbers of cases see Table 159.)

order of the branches remains the same, with only a few exceptions, when separate camps are under consideration. The only exceptions to be noted are in the case of the Engineers at Camp Devens and the medical corps at Camp Dix. The former drop from first to third place, and the latter fall below the dental corps.

TABLE 159.—*Percentage distribution of scores by branches of the service—Examination a—Officers (white) from Camp Devens, Dix, Lee, and Taylor.*

Score.	Branches of service.						
	Engineer.	Artillery.	Infantry.	Quartermaster Corps.	Medical.	Dental.	Veterinary.
400–414	0.3		[1] 0.0				
390–399	1.2	0.7	.1	0.4			
380–389	1.5	.7	1.1	.4	0.5		
370–379	3.3	3.2	1.9	1.1	.6		
360–369	5.7	4.7	2.8	3.4	1.9		1.9
350–359	5.4	6.9	4.0	3.2	2.2	0.9	
340–349	9.5	6.8	5.2	3.2	2.3	1.7	
330–339	11.0	7.5	7.3	6.2	3.9	3.4	3.7
320–329	9.8	11.3	8.0	7.4	4.2	6.9	3.7
310–319	9.8	9.4	8.6	7.9	7.5	5.2	9.3
300–309	9.8	9.0	7.9	5.7	5.6	6.9	
290–299	6.5	7.1	9.1	8.5	7.2	3.4	7.4
280–289	6.0	7.1	7.8	8.3	6.1	3.4	3.7
270–279	5.1	2.9	6.5	7.0	8.3	10.4	
260–269	2.4	4.3	4.7	6.4	6.1	15.5	3.7
250–259	3.0	4.0	5.0	6.2	6.4	3.4	9.3
240–249	2.7	2.7	4.7	4.9	6.6	6.0	3.7
230–239	1.2	2.5	3.4	4.3	5.2	5.2	3.7
220–229	1.8	1.6	2.6	1.9	4.2	4.3	7.4
210–219	1.2	1.9	2.1	2.6	3.4	6.0	9.3
200–209	.3	1.3	1.8	2.8	3.3	5.2	3.7
190–199	.9	.9	1.4	2.1	3.3	4.3	9.3
180–189	.6	1.5	.7	1.7	3.6	.9	3.7
170–179		.3	.8	1.7	1.7	.9	
160–169	.3	.4	.8	.9	2.0	2.6	1.9
150–159	.3	.3	.4	1.1	1.7		
140–149	.3	.3	.3	.2	.8	1.7	9.3
130–139		.3	.3	.2	.3	.9	1.9
120–129		.3	.1		.5		
110–119			.2		.2		3.7
100–109		.1	.2	.2		.9	
90– 99	.3				.2		
80– 89			[1] .0				
70– 79				.2			
60– 69			[1] .0		.2		
50– 59							
0– 49							
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Number of cases	336	680	2,050	470	639	116	54

[1] Indicates less than 0.1 per cent.

TABLE 160.—*Comparison of median scores of officers by branches of the service in four camps—Examination a.*

Arm.	Devens.	Dix.	Lee.	Taylor.	All four camps.	Quartile deviation.
Engineers	307	313	326	311	316	27
Artillery	323	305	311	295	310	30
Infantry	306	299	294	290	296	33
Quartermaster Corps	298	284	289	273	286	39
Medical Corps	286	246	273	268	270	39
Dental	272	261	253	234	262	38
Veterinary	246	233	226	192	231	43

TABLE 161.—*Number of cases from which figures in Table 160 are obtained.*

Arm.	Devens.	Dix.	Lee.	Taylor.	All four camps.
Engineers	65	78	145	48	336
Artillery	187	107	227	159	680
Infantry	384	332	921	413	2,050
Quartermaster Corps	94	103	168	105	470
Medical Corps	150	201	199	89	639
Dental	45	37	29	5	116
Veterinary	10	20	21	3	54
Total	935	878	1,710	822	4,345

Figure 21 may also be considered in comparison with the similar diagram for enlisted men (fig. 4). It will be noted that the sharp distinction apparent wherever officers in general are compared with enlisted men in general disappears when classification is made by branches, the steps appearing far more gradual. In fact, the branch ranking highest among the enlisted men (the field signal battalion) surpasses the lowest branch of the officers (the Veterinary Corps).

Table 162 gives means and standard deviations for the officer groups, affording still another basis of comparison of branches of the service. Table 163, supplementing the preceding table, indicates the importance to be attached to the observed differences by expressing these as multiples of their probable errors. It has seemed necessary to compare only pairs adjacent to one another in order of excellence, except where the difference fails to carry conviction regarding its validity. Inspection of Table 163 shows that differences between branches exceed four times the probable error in all cases except in the comparison of the Medical Corps with the dental and of the dental with the veterinary. The relative unreliability of these differences is apparently mainly due to the small number of cases in the latter two groups. The Medical Corps is, however, clearly distinguished from the Veterinary Corps on the one hand as it is from the Quartermaster on the other.

TABLE 162.—*Comparison of officers by branches of service—Means and standard deviations—Examination a.*

	Engineers.	Artillery.	Infantry.	Quartermaster Corps.	Medical.	Dental.	Veterinary.
Mean	311.3	302.6	290.6	281.7	265.1	259.2	236.3
± P. E.	±1.68	±1.29	±.76	±1.64	±1.48	±3.16	±5.72
σ	45.7	50.1	50.8	52.7	55.4	50.5	62.3
Number of cases	336	680	2,050	470	639	116	54

TABLE 163.—*Comparison of officers by branches of service—Ratio of differences between means to probable errors of differences. (Cf. Table 162.)*

Groups compared.	Difference÷P. E. diff.
Engineers with artillery	6.1
Artillery with infantry	8.0
Infantry with Quartermaster Corps	4.9
Quartermaster Corps with medical	7.5
Medical with dental	1.7
Dental with veterinary	3.5
Medical with veterinary	4.8

Comparison of ranks.—Distributions of officers by ranks are shown in table 164, the data summarized by grades appearing in figure 24. Table 165 shows the medians of the various ranks by totals and by camps. Table 167 gives means and standard deviations of the different ranks. Table 168, supplementing table 167, indicates the probable validity of observed differences between means by expressing these in terms of probable errors of the differences.

The various forms of data here presented all indicate the same facts regarding differences between ranks. It should be noted, however, that comparison of ranks is more or less influenced by differences between branches, since certain branches have much larger proportions in certain ranks than in others. For example, the Medical Corps has no representation among second lieutenants, whereas it contributes considerable numbers to the group of first lieutenants. It is to be expected, therefore, that the standing of first lieutenants as compared with that of second lieutenants should be influenced by the status of the Medical Corps. (See preceding section.) To check the influence of this factor we have figured results for first lieutenants both with and without the medical units. (The medical members have not, however, been eliminated from the higher ranks.)

It is evident from figure 24 that the differences between ranks are not large and also that there is not a consistent trend from lower to higher ranks. The slight inferiority of first lieutenants to second lieutenants attracts attention, though this is reduced by the dropping

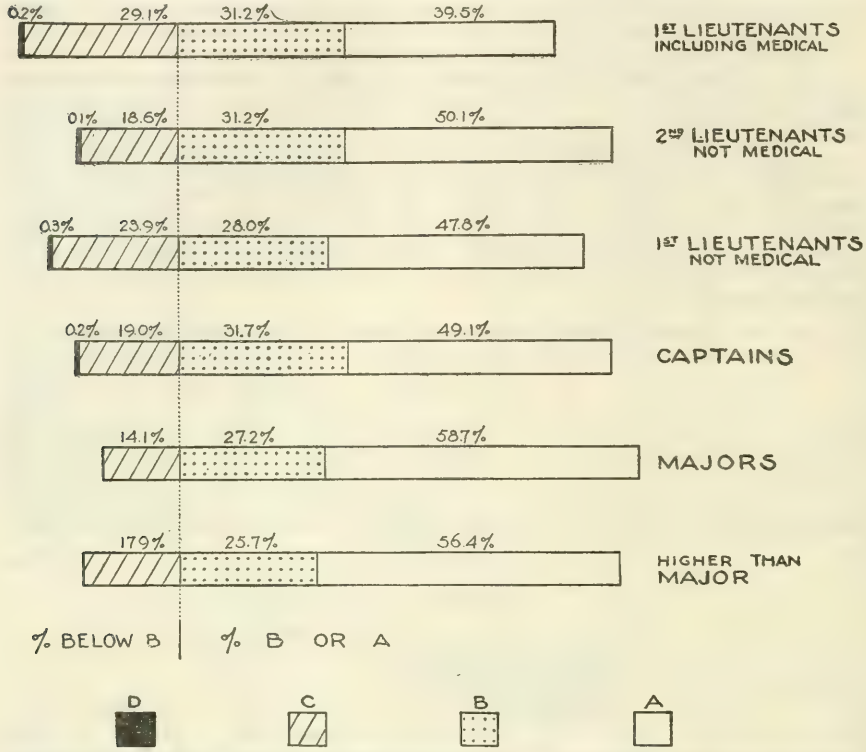


FIG. 24. Comparison of officers by ranks, showing percentages in each letter grade. Second lieutenants, 2,481; first lieutenants (including medical), 1, 640; first lieutenants (not medical), 1,080; captains, 989; majors, 121; higher than major, 78.

out of medical first lieutenants. The main other point of interest in this rough comparison is the fact that the superiority of the ranks of major and "higher" is evident chiefly in their proportion of distinctly superior men (A grade) and their lack of extremely inferior men.

TABLE 164.—*Percentage distribution of scores by ranks—Examination a—Officers (white), from Camps Devens, Dix, Lee, and Taylor.*

Score.	Second lieutenant.	First lieutenant.	Captain.	Major.	Higher than major.	First lieutenant, excluding medical.
410–414						
400–409				0.8		
390–399	0.3	0.4	0.2			0.6
380–389	.8	.6	1.1	2.5	1.3	.7
370–379	2.0	1.3	1.9	3.3	1.3	1.7
360–369	3.3	2.3	3.2	3.3	3.9	2.7
350–359	4.5	3.2	5.0	6.6	6.4	4.1
340–349	5.3	4.3	5.9	8.3	6.4	5.5
330–339	7.1	6.6	6.9	4.1	7.7	8.0
320–329	8.7	6.9	8.2	10.8	10.3	8.3
310–319	9.4	7.9	8.1	13.2	11.5	8.3
300–309	8.6	6.2	8.6	5.8	7.7	8.1
290–299	8.1	7.8	7.8	6.6	5.1	6.7
280–289	7.3	6.7	6.9	8.3	5.1	7.1
270–279	6.1	6.3	6.7	4.1	5.1	5.6
260–269	5.2	5.4	5.0	4.1	2.6	3.9
250–259	4.5	5.1	5.5	4.1	7.7	4.8
240–249	4.6	5.5	3.7	3.3	1.3	5.0
230–239	3.1	3.9	2.9	3.3	5.1	3.4
220–229	2.7	3.7	1.9	1.7	2.6	3.1
210–219	2.1	3.3	2.0		1.3	3.2
200–209	2.0	2.8	1.4	.8	3.9	1.9
190–199	1.3	2.4	1.3	1.7	1.3	1.5
180–189	.9	2.0	1.4	.8	1.3	1.3
170–179	.4	1.3	1.0	.8	1.3	1.0
160–169	.5	1.4	1.2	.8		.9
150–159	.4	.7	.7	.8		.5
140–149	.4	.7	.6			.6
130–139	.1	.6	.4			.7
120–129	.1	.2	.1			.2
110–119	[1] .0	.2	.1			.4
100–109	.1	.2	.1			.3
90–99		.1				.2
80–89		.1				1
70–79			.1			
60–69		.1	.1			
50–59	[1] .0					
40–49						
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of cases	2,481	1,640	989	121	78	1,080

[1] Indicates less than 0.1 per cent.

TABLE 165.—*Comparison of officers by ranks and by camps—Median scores in examination a.*

Rank.	Median score.					Quartile deviations all four camps.
	Devens.	Dix.	Lee.	Taylor.	All four camps.	
Second lieutenant	311	300	296	291	300	33
First lieutenant	293	270	290	276	285	39
Captain	310	295	293	292	297	35
Major	315	277	319	297	312	26
Higher than major	317	(354)	300	310	307	36
First lieutenant, excluding medical	303	303	296	280	296	41

TABLE 166.—*Number of cases from which figures in Table 165 are obtained.*

Rank.	Devens.	Dix.	Lee.	Taylor.	All four camps.
Second lieutenant	583	473	842	583	2,481
First lieutenant	308	338	614	380	1,640
Captain	241	224	296	228	989
Major	29	13	51	28	121
Higher than major	24	1	32	21	78
First lieutenant, excluding medical	183	147	472	278	1,080
Total (first five groups)	1,185	1,049	1,835	1,240	5,309

TABLE 167.—*Comparison of officers by ranks—Means and standard deviations—Examination a.*

	Second lieutenant.	First lieutenant.	Captain.	Major.	Higher than major.	First lieutenant, excluding medical.
Mean	296.5	278.2	290.8	303.4	290.5	286.8
±P. E.	±.60	±.93	±1.15	±3.02	±3.75	±1.14
σ	48.9	37.4	35.5	19.3	19.1	35.6
Number of cases	2,481	1,640	989	121	78	1,080

TABLE 168.—*Comparison of officers by ranks—Ratio of the differences between means to the probable errors of the differences.*

Rank.	First lieutenant.	Captain.	Major.	Higher than Major.	First lieutenant, excluding medical.
Second lieutenant	13.3	2.0	3.2	0.8	5.1
First lieutenant		8.5	8.0	4.7	5.8
Captain			3.9	1.5	2.5
Major				1.4	5.1
Higher than major					2.5

Reference to table 164 shows that these ranks have no men falling below 150 (C), whereas the three ranks below them contain men of C− grade and even scattering D cases. (It will be noted that data for the highest two groups are less reliable than those for other ranks owing to the relatively small number of cases. This is especially true for the data summarized by camps. Differences of this sort can not therefore be stressed.)

Table 168 indicates the degree of significance to be attached to differences between means of the various ranks. In conjunction with table 167, this indicates that the second lieutenants are distinguished with a high degree of certainty only from the first lieutenants, appearing as superior to the latter. The slight inferiority of the second lieutenants to the captains, majors, and officers of higher rank does not appear certainly valid. The first lieutenants, as a whole, show mental rating inferior to that of all other ranks, and the difference is sufficient to be considered valid. (Elimination of medical first lieutenants from this group raises the average by a significant amount above the average for the total group of first lieutenants, but not by a sufficient amount to affect the reliability of the differences between these and other groups except in two instances.) The ranks of captain, major, and higher ranks fail to be significantly distinguished either from one another or from second lieutenants. The small numbers of cases in the two highest groups are apparently mainly responsible for failure of these ranks to show clear distinctions. From the data at hand, therefore, the only fact which stands out as convincingly evident is that of the relative inferiority of the group of first lieutenants.

FURTHER DATA ON OFFICERS' TRAINING CAMPS, THIRD SERIES.

The relationship of candidate officers to officers on the one hand, and enlisted men on the other, has been discussed in an earlier section (pp. 511 ff.). The main further comparisons of significance concerning themselves with (1) differences between various stations, and (2) differences between different types of training groups.

Differences between stations.—Tables 169 and 170 present data on 22 stations of the third series made up of Infantry and Artillery units, and also on the Engineer reserve officers' training camp at Lee. For convenience the stations have been arranged in order of excellence as indicated by median scores in examination *a*. Table 169 gives values of the medians, first quartiles, and third quartiles. Table 170 shows the percentages in each camp making given grades. The 22 camps have been arbitrarily separated into 11 better and 11 poorer camps to facilitate comparison, although it is evident that steps from one camp to another are very gradual. Differences between the extremes are, however, marked.

From Table 169 it appears that the medians range from 299 to 245—a difference of obvious validity. The average median score of the better 11 camps is 283 as compared with 259 for the poorer 11. Figure 25 presents graphically the medians of the various stations. Comparing this figure with figure 18 we note that the medians of these various camps fill in almost the whole range from that of the officers on the one hand (296) to that of the Taylor sergeants on the other (232), the highest of the training-camp group showing a higher median than the general-officer group, but the lowest of the training camps failing to drop to quite the level of the sergeant group.

FIG. 25. Medians of officers' training camp stations, third series. Numbers of cases given in parentheses.

TABLE 169.—*Comparison of officers' training camps—Medians, first and third quartiles, and quartile deviations—Examination a—22 stations (third series) and Engineer reserve officers' training camp at Lee.*

Station.	Number of cases.	First quartile.	Median.	Third quartile.	Quartile deviation.
Engineer reserve officers' training camp	1,505	256	293	323	34
1. Devens	711	259	299	331	36
2. Grant	518	261	296	328	34
3. Dodge	467	252	288	323	36
4. Custer	604	251	285	313	31
5. Sherman	494	241	281	318	39
6. Taylor	487	248	281	310	31
7. Meade	713	234	279	314	40
8. Jackson	320	234	278	314	40
9. Upton	853	238	276	314	38
10. Dix	249	237	276	313	38
11. Wadsworth	571	232	276	314	41
Total	5,987		[1] 283		
12. Funston	525	242	274	305	32
13. Lee	588	226	269	306	40
14. Doniphan	422	233	265	300	34
15. Travis	489	223	263	298	38
16. Hancock	478	222	261	298	38
17. McClellan	458	220	260	299	40
18. Pike	631	221	260	298	39
19. Gordon	589	213	255	297	42
20. Bowie	477	211	252	286	38
21. Stanley	3,541	207	248	287	40
22. Oglethorpe	1,108	203	245	284	41
Total	9,306		[1] 259		
Grand total	[2] 16,798				

[1] Average. [2] Including Engineer officers' training camps.

Fully as obvious differences are to be noted in table 170. Percentages of A grades range from 49.7 per cent to 15.3 per cent, and percentages of A and B grades from 79.5 per cent to

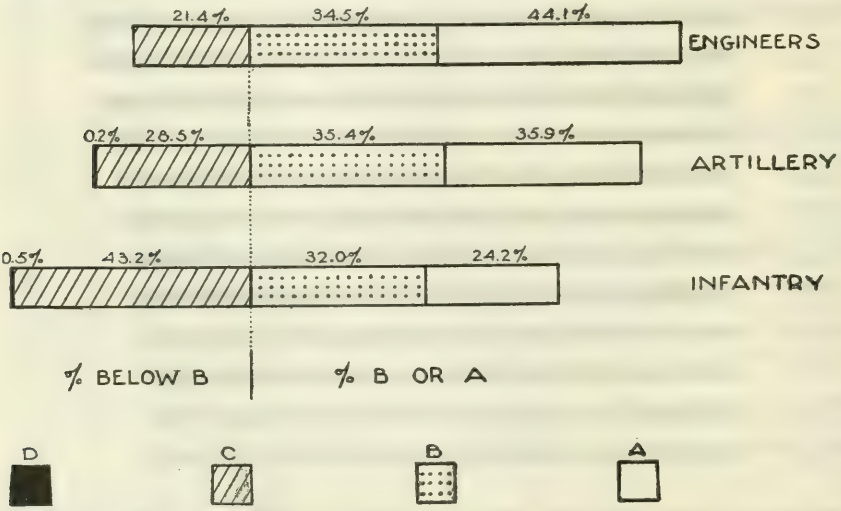


FIG. 26. Comparison of infantry (8,573), artillery (3,707), and engineer (1,505) candidate officers, showing percentages in each letter grade.

46.9 per cent. In the 11 better camps, as a whole, the percentage of A grades is 38.4 per cent, and that of A and B grades 71.9 per cent, as contrasted with percentages for the 11 poorer camps of 20.7 per cent of A grades and 53.6 per cent of A or B grades. This discrepancy in percentages of high-grade cases is even more important for its bearing on the efficiency of the several training camps than differences in the central tendencies of the groups, since the main requisite

is that the training unit contains officer timber in sufficient quantity. A camp containing only 50 to 60 per cent of A and B men, as did the majority of the poorer camps listed above, must have been seriously handicapped in the attempt to select men for commissions who should measure up to the standard of mental ability of the officers already in the Army. To what extent the officers commissioned from these training schools reflected the general status of their schools can not be stated in the absence of figures regarding elimination from these camps.

TABLE 170.—*Comparison of officers' training camps—Percentages in various grades by examination a—22 stations (third series) and Engineer reserve officers' training camp at Lee.*

Station.	Number of cases.	Percentage making grade—					A or B.
		E.	D.	C.	B.	A.	
Engineer reserve officers' training camp	1,505			21.3	34.5	44.2	78.7
1. Devens	711			20.5	29.8	49.7	79.5
2. Grant	518		0.6	19.9	32.2	47.3	79.5
3. Dodge	467			23.8	33.4	42.8	76.2
4. Custer	604		.2	24.3	39.2	36.2	75.4
5. Sherman	494		.2	29.8	32.4	37.7	70.1
6. Taylor	487		.4	25.7	41.3	32.6	73.9
7. Meade	713		.3	33.7	30.4	35.6	66.0
8. Jackson	320		.3	33.8	31.3	34.7	66.0
9. Upton	853		.5	31.3	33.3	34.9	68.2
10. Dix	249		.4	30.9	37.4	32.1	69.5
11. Wadsworth	571		.3	29.2	31.8	38.8	70.6
Total	5,987		.3	27.8	33.5	38.4	71.9
12. Funston	525		.4	30.7	40.2	28.8	69.0
13. Lee	588		.5	35.9	33.8	29.8	63.6
14. Doniphan	422		.2	37.0	38.4	24.4	62.8
15. Travis	489		.4	39.5	36.8	23.3	60.1
16. Hancock	478		.2	40.2	36.4	23.2	59.6
17. McClellan	458		.2	42.6	33.0	24.2	57.2
18. Pike	631		.2	43.8	32.8	23.3	56.1
19. Gordon	589		.3	47.2	29.6	22.9	52.5
20. Bowie	477		.4	48.2	36.1	15.3	51.4
21. Stanley	3,541		.7	50.6	30.9	17.8	48.7
22. Oglethorpe	1,108		.9	52.2	30.6	16.3	46.9
Total	9,306		.5	45.8	32.9	20.7	53.6
Grand total	[1] 16,798		.4	37.2	33.3	29.1	62.4

[1] Including Engineer officers' training camps.

Differences between different types of training groups; Infantry, Artillery, and Engineer.—The men of the 22 stations were assigned to companies or batteries according as they were training for Infantry or Artillery. In addition to these camps the Engineer reserve officers' training camp, established at Lee but drawing from other camps as well, afforded a very specific type of training. From 17 of the stations data were so reported that it was possible to make comparisons of Artillery and Infantry training units with reference to the general mental caliber of the men admitted to training. Table 171 and figure 26 show the percentages of each of these groups, as well as of the Engineer candidate officers, making various grades. The order of excellence here shown is (1) Engineer, (2) Artillery, (3) Infantry. The fact of a more rigid selection for the two former groups is generally recognized, for specialized technical training was required for the Engineering group, and a considerable amount of mathematics for the Artillery. The superiority of the Artillery to the Infantry candidates appeared for each camp as well as for the summarized data for all 17 camps.

TABLE 171.—*Percentages of candidate officers of different training groups in the various letter grades by examination a.*

Grade.	Engineer.	Artillery.	Infantry.
A	44.1	35.9	24.2
B	34.5	35.4	32.0
C	21.4	28.5	43.2
D		0.2	0.5
E			

SECTION 7.—*Data concerning negro troops.*

Examining of negro troops in any considerable numbers was carried on only at Lee and at Dix. Differences shown in these two camps were sufficiently marked to leave no question regarding their genuineness.

At Camp Dix 1,111 negro enlisted men of the Three hundred and forty-ninth and Three hundred and fiftieth Field Artillery Regiments were examined. Of these, 266, or 23.9 per cent, were unable to take examination *a*, because of illiteracy. Contrasted with the 8.6 per cent of white enlisted men excluded from *a* at this camp, this percentage in itself is indicative of an important difference between negro and white troops. The negro group was made up of men drafted from the same general section of the country as the white troops (New York and New Jersey), so that geographical selection is not responsible for the difference. Table 172 and figure 27 show the percentage distributions of this group of negro enlisted men in comparison with the white enlisted men at Dix. The difference is sufficiently striking to require no comment. Comparison of medians shows equally marked differences—median for white enlisted men (Dix) $=171$; median for negro enlisted men (Dix) $=53$. In fact, the upper quartile of the negro group is far below the median for the whites. Only 1.3 per cent of the negroes made A or B grades as compared with 19.2 per cent of the whites.

TABLE 172.—*Percentage distribution of scores by race—Enlisted men.*

Score.	Grade.	Camp Dix.		Camp Lee.	
		White.	Negro.	White.	Negro.
350–414	A	0.9	.....	0.5	.....
300–349	A	6.0	0.2	3.1	[1] 0.0
250–299	B	12.3	1.1	6.7	.3
200–249	C+	18.1	3.5	11.1	.9
150–199	C	21.8	7.4	16.0	3.0
100–149	C−	19.4	16.5	18.7	6.6
50–99	D	9.6	22.6	16.5	15.9
0– 49	E	3.3	24.8	9.7	33.7
Eliminated as illiterate	.....	8.6	23.9	17.7	39.6
Number of cases	.....	10,936	1,111	26,640	5,774
Median (Md.) [2]	.....	171	53	116	14.8
Upper quartile (Q_3) [2]	.....	234	111	189	54.0
Range from Q_3 to Md. [2]	.....	63	58	73	39.2
Percentage A or B	.....	19.2	1.3	10.3	0.3

[1] Less than 0.1 per cent.
[2] These values figured for total including illiterates, counting these as falling in the lower half of the distribution.

At Camp Lee 5,774 negro men, drafted mainly from Virginia and representing 39 companies, were examined. Of these, 3,489 were able to take examination *a*, while 2,285, or 40 per cent, were excluded on account of illiteracy. It will be remembered that only 18 per cent of the white drafted men from the same general locality were eliminated on this ground. The proportion of illiteracy, as determined by the Lee standards of segregation, is thus more than twice as great among the negro recruits as among the white recruits of this region. Percentage distributions of these two groups are shown in table 172 and figure 28. It is evident that the negro group is not only markedly lower mentally than the white, but that the Lee negro group is much lower than the Dix. This may represent a difference between northern and southern negro groups, though evidence from additional groups would be necessary to establish this point. The medians, upper quartiles, and percentages making A or B grades show the same striking differences.

Table 173 and figure 29 show in greater detail the percentage distributions of these two groups. It is evident that the impressiveness of the difference is not reduced by the initial elimination for illiteracy, which has removed from consideration so much larger a fraction of the negro than of the white group. The means of the two groups are shown in table 174; white enlisted men, 147.6 ± 0.37; negro enlisted men, 58.3 ± 0.58. It will be noted also that the dispersion of the negro group, as indicated by the standard deviations, is smaller than that of the white.

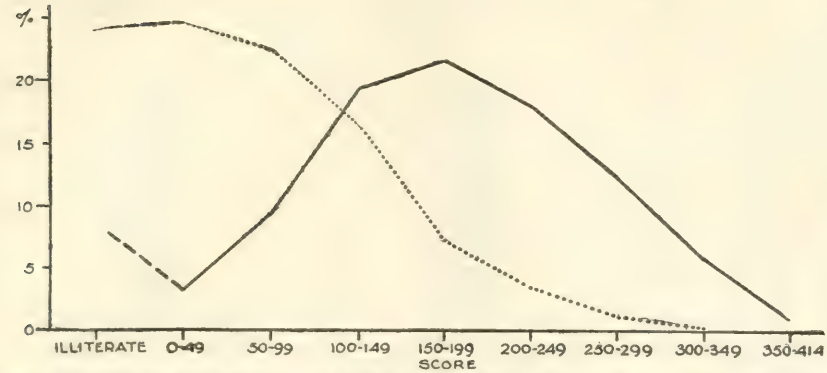


FIG. 27. Percentage distributions of negro (.....) and of white (——) enlisted men. Camp Dix, negro, 1,111; white, 10,936. (Note that "illiterates," for whom percentages are given, do not properly fall on same scale of abscissæ as do the score values.)

FIG. 28. Percentage distributions of negro (.....) and of white (——) enlisted men. Camp Lee, negro, 5,774; white, 26,640. (See note on fig. 26.)

FIG. 29. Detailed percentage distributions of negro (.....) and of white (——) enlisted men. Camp Lee, negro, 3,489; white, 21,924. (Arrows show range of standard deviations. Means indicated by cross line on line connecting arrows.)

TABLE 173.—*Percentage distribution of negro enlisted men and of white enlisted men (Camp Lee)—Examination a.*

[Literate cases only; 39.6 per cent of total negro group are not included in table because prevented by illiteracy from taking examination *a*; only 17.7 per cent of white group are similarly excluded.]

Score.	White.	Negro.	Score.	White.	Negro.
410-414	.....	.....	190-199	2.3	0.7
400-409	[1]0.0	.....	180-189	3.9	.7
390-399	[1].0	.....	170-179	3.9	.8
380-389	[1].0	.....	160-169	4.1	1.3
370-379	.1	.....	150-159	4.3	1.4
360-369	.1	.....	140-149	4.7	1.5
350-359	.3	.....	130-139	4.4	1.8
340-349	.4	.....	120-129	4.5	2.3
330-339	.7	.....	110-119	4.6	2.4
320-329	.7	.....	100-109	4.6	2.9
310-319	1.1	.....	90-99	4.4	4.0
300-309	1.1	[1]0.0	80-89	4.0	4.0
290-299	1.2	.1	70-79	4.4	4.8
280-289	1.6	.1	60-69	3.7	6.7
270-279	1.6	.2	50-59	3.6	6.9
260-269	1.6	.1	40-49	3.5	7.8
250-259	2.2	[1].0	30-39	2.6	10.6
240-249	2.3	.2	20-29	2.5	13.4
230-239	2.4	.2	10-19	2.0	13.1
220-229	2.8	.2	0-9	1.2	11.0
210-219	2.9	.3			
200-209	3.0	.5	Number of cases	21,924	3,489

[1] Indicates less than 0.1 per cent.

TABLE 174.—*Comparison of negro enlisted men with white (Camp Lee)—Means and standard deviations—Examination a.*

[Literate cases only; 39.6 per cent of total negro group are not included in table because prevented by illiteracy from taking examination *a*; only 17.7 per cent of white group are similarly excluded.]

	White.	Negro.
Mean	147.6	58.3
$\pm$ P. E.$_M$	$\pm$.37	$\pm$.58
σ	81.8	50.8
Number of cases	2,924	3,489

An interesting attempt was made at Lee to further distinguish within the negro group on the basis of skin color. Two battalions were classified as lighter or darker on the basis of off-hand inspection. The median score of the darker group in examination *a* was 40; that of the lighter group 51. Two other battalions were classified as black, brown, and yellow on the basis of skin color. The median score of the "black" negroes in *a* was 39; that of the "yellow" was 59; while that of the "brown" negroes fell between these values.[1]

At Camp Dix 106 negro officers of the Three hundred and forty-ninth and Three hundred and fiftieth Field Artillery Regiments were also examined. Table 175 presents data for this group in comparison with white officers at Dix. The percentages distributions of these two groups are shown in figure 30; a similar comparison of this group of negro officers in comparison with negro enlisted men at Dix is shown in figure 31. Again, the negro group appears markedly inferior to the white, though it is also true that the negro officer group shows a marked superiority to the negro enlisted men.

TABLE 174.—*Percentage distribution of scores by race—Examination a—Officers—Camp Dix.*

Score.	Grade.	Negro.	White.
350-414	A	0.9	8.0
300-349	A	12.3	36.5
250-299	B	17.9	31.5
200-249	C+	29.3	15.8
150-199	C	23.6	7.1
100-149	C−	7.5	1.2
50-99	D	6.6	.....
0-49	E	1.9	.....
Eliminated as illiterate		0	0
Number of cases		106	1,052
Median (md.)		218	294
Upper quartile (Q_3)		267	325
Lower quartile (Q_1)		169	253
Quartile deviation (Q)		49	35
Percentage A or B		31.1	76.0

[1] The medians of this paragraph were figured for those who actually took examination *a* without reference to those eliminated because of illiteracy. They are therefore higher than the median for the total Lee group reported in Table 172.

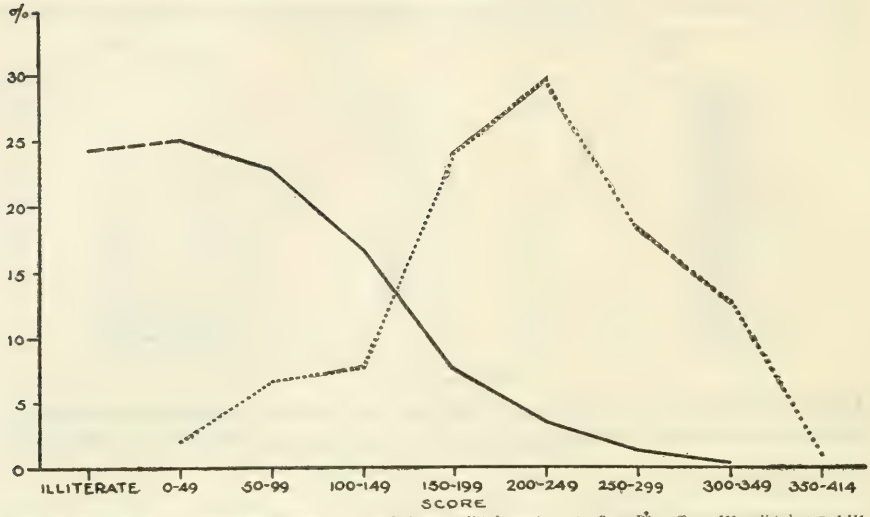


FIG. 30. Percentage distributions of negro officers (.....) and of negro enlisted men (——). Camp Dix, officers, 106; enlisted men, 1,111. (See note on fig. 26.)

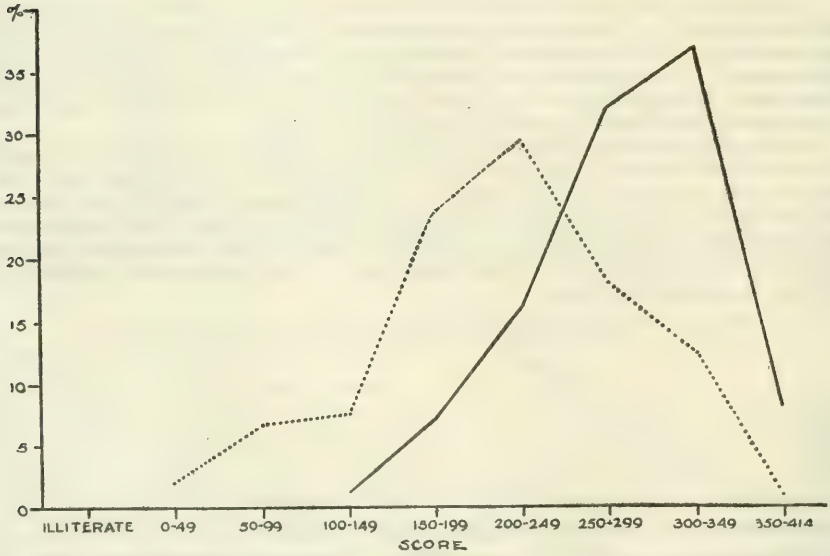


FIG. 31. Percentage distributions of negro officers (.....) and of white officers (——). Camp Dix, negro, 106; white, 1,052.

CHAPTER 15.

ADDITIONAL STATISTICS ON EXAMINATION *a*

A certain amount of statistical data in addition to that discussed in connection with the account of the revision of examination *a* was received as a result both of camp studies and of special investigations with other groups. The more important of these data are presented here for purposes of reference.

SECTION 1.—*Distributions of scores for the separate tests of examination a.*

Distributions of scores in the separate tests of examination *a* were received for several different types of groups. These are presented herewith without discussion or computation of constants. Raw scores are used in all cases.

Since these distributions were sent in from different camps and at different times the grouping of scores for purposes of summary is not always the same. For example, in test 3 the grouping in one case is 0–1, 2–3, etc., while for the others it is 0, 1–2, 3–4, etc. This introduces a certain amount of awkwardness into the tables.

A brief description of the several groups is offered, for its bearing on the interpretation of results.

Group 1. Officers, Camp Lee.—This group of officers from Camp Lee is probably reasonably representative not only of the officers of Camp Lee, but of the whole group of officers given examination *a*. (It has been shown elsewhere that the mean score of the Lee officers is practically the same as that for the officers of all four camps.) The numbers of cases reported for the various tests varies from 569 to 576.

Group 2. Candidate officers. Camp Dix.—This group is made up of 249 men admitted to the third officers' training camp at Camp Dix who had not been given the examination previously as privates.

Group 3. Selected group of sergeants, Camp Devens.—This group of 176 men had been sergeants before their selection for admission to officers' training camp. They are distinctly superior to the usual run of sergeants. They are doubtless more nearly representative of the Devens officers' training camp group.

Group 4. Enlisted men, Camp Devens.—These 400 cases were selected in such a way that the distribution of their total weighted scores corresponds approximately to the distribution of total weighted scores of all enlisted men who took examination *a* at Camp Devens. This implies the usual segregation for illiteracy, which, we have seen (see p. 489), eliminated approximately 20 per cent of the cases at this camp.

Group 5. Enlisted men, Camp Dix.—These 921 cases constitute the major part of the Three hundred and thirty-third Engineers as made up in the early fall of 1917. This organization was examined very completely; no elimination on the ground of illiteracy was made. This procedure naturally operates to increase greatly the percentages making low scores, as compared with those for the other group of enlisted men reported (group 4).

Group 6. Negro enlisted men, Camp Lee.—The 260 negroes here reported were from three companies. These men were considered typical of all the negro troops examined at Camp Lee, since their distribution corresponded closely with that of the total group. It may be noted that the negroes examined at Camp Lee had been found distinctly inferior to those examined at Dix.

The distributions of the various groups above described are presented in tables 176 to 185.

TABLE 176.—*Examination a—Distribution of scores.*

Group.	Number of cases.	Score in test 1.										
		0	1	2	3	4	5	6	7	8	9	10
1. Officers (Lee)	572	0	0	0	1	3	20	27	68	81	156	216
2. Officers' training camp (Dix)	249	1	2	1	4	6	13	18	28	46	70	60
3. Selected sergeants (Devens)	173	0	0	0	1	1	5	9	14	23	48	72
4. Enlisted men (Devens)	400	10	11	13	27	28	55	45	51	66	53	41
5. Enlisted men (Dix)	921	89	61	70	70	81	84	102	91	98	98	77
6. Negroes (Lee)	260	70	46	42	21	33	23	8	7	5	4	1

TABLE 177.—*Examination a—Distribution of scores.*

Group.	Number of cases.	Score in test 2.												
		0	1	2	3	4	5	6	7	8	9	10	11	12
1	575	0	0	0	7	17	30	63	85	101	86	74	61	48
2	249	0	0	1	6	16	19	24	39	39	35	31	22	17
3	176	0	0	1	3	5	12	13	34	22	32	28	14	12
4	400	7	4	13	24	36	43	68	60	54	40	22	16	13
5	921	74	17	44	68	109	134	121	122	96	50	45	22	19
6	260	44	25	33	47	36	27	25	12	5	4	1	1	0

TABLE 178.—*Examination a—Distribution of scores.*

Group.	Number of cases.	Score in test 3.										
		0–	2–	4–	6–	8–	10–	12–	14–	16–	18–	20
1	570	28	10	9	19	27	45	79	83	109	77	84
		0	1–	3–	5–	7–	9–	11–	13–	15–	17–	19–
2	249	18	7	4	10	7	25	38	38	40	41	21
3	176	9	4	5	7	8	13	18	21	38	24	29
4	400	98	34	30	26	45	37	37	25	22	30	16
5	921	331	78	74	76	75	71	64	61	36	37	18
6	260	174	37	22	14	4	6	0	1	0	2	0

TABLE 179.—*Examination a—Distribution of scores.*

Group.	Number of cases.	Score in test 4.										
		0–	2–	4–	6–	8–	10–	12–	14–	16–	18–	20
1	569	1	0	4	8	44	129	181	117	61	20	6
		0	1–	3–	5–	7–	9–	11–	13–	15–	17–	19–
2	249	1	1	1	7	21	43	68	62	22	19	4
3	176	0	0	0	2	6	19	60	48	30	11	0
4	400	1	9	25	50	77	99	71	33	25	8	2
5	921	90	36	59	98	185	194	152	69	25	10	3
6	260	38	66	60	46	33	8	9	3	0	0	0

TABLE 180.—*Examination a—Distribution of scores.*

Group.	Number of cases.	Score in test 5.														
		0–	4–	8–	12–	16–	20–	24–	28–	32–	36–	40				
1	572	2	0	1	1	4	23	79	120	191	144	7	.....	.....	.....	.....
		0	1–	4–	7–	10–	13–	16–	19–	22–	25–	28–	31–	34–	37–	40
2	249	0	0	0	0	5	2	4	6	10	44	46	58	57	17	0
3	176	0	0	0	0	0	0	4	7	19	21	38	38	23	26	0
4	400	6	4	5	8	19	29	45	60	74	52	35	32	22	7	2
5	921	121	20	20	33	49	90	106	88	95	93	70	75	40	20	1
6	260	83	54	23	35	24	21	10	4	3	0	1	0	0	0	0

TABLE 181.—*Examination a—Distribution of scores.*

Group.	Number of cases.	Score in test 6.														
		0–	4–	8–	12–	16–	20–	24–	28–	32–	36–	40–				
1	569	3	2	5	21	26	58	88	127	118	86	35				
		0	1–	4–	7–	10–	13–	16–	19–	22–	25–	28–	31–	34–	37–	40
2	249	0	4	4	5	6	7	19	11	28	36	39	43	29	11	7
3	174	2	2	0	2	3	4	10	15	24	19	22	23	31	9	8
5	921	194	59	78	84	82	76	95	66	42	43	46	31	15	9	1
6	260	131	56	25	19	12	7	4	2	1	3	0	0	0	0	0
		0	1–	5–	9–	13–	17–	21–	25–	29–	33–	37				
4	400	32	36	50	51	62	41	37	35	29	11	16				

TABLE 182.—*Examination a—Distribution of scores.*

Group.	Number of cases.	Score in test 7.										
		0	1	2	3	4	5	6	7	8	9	10
1	576	2	7	17	37	58	88	109	99	88	26	45
2	249	3	9	15	25	35	46	40	26	28	9	13
3	176	5	5	13	12	15	23	25	28	28	7	15
4	400	60	26	42	51	73	56	40	19	21	4	8
5	921	256	70	91	110	117	92	71	53	27	15	19
6	260	159	33	23	25	13	5	2	0	0	0	0

TABLE 183.—*Examination a—Distribution of scores.*

Group.	Number of cases.	Score in test 8.															
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	570	23	8	8	3	16	13	26	29	31	55	59	53	62	95	42	47
2	249	14	6	4	2	5	8	12	8	13	19	23	27	38	42	16	12
3	176	16	1	2	1	6	4	9	10	6	8	15	13	25	22	20	18
4	400	76	51	30	25	15	29	16	29	13	10	22	17	25	20	11	11
5	921	294	86	60	39	54	56	62	40	34	32	31	27	44	26	18	18
6	260	109	63	31	17	12	11	5	6	1	1	2	2	0	0	0	0

TABLE 184.—*Examination a—Distribution of scores.*

Group.	Number of cases.	Score in test 9.													
		0–	4–	8–	12–	16–	20–	24–	28–	32–	36–	40			
1	574	15	21	37	35	32	61	73	99	117	71	13			
		0	1–	4–	7–	10–	13–	16–	19–	22–	25–	28–	31–	34–	37–	40
2	249	5	11	12	10	8	9	15	30	34	34	23	34	13	11	0
3	176	2	3	7	4	15	9	15	11	16	19	20	22	18	15	0
5	921	216	159	103	105	53	54	45	35	43	34	27	14	21	11	1
6	260	129	81	32	12	4	0	0	1	0	1	0	0	0	0	0
		0	1–	5–	9–	13–	17–	21–	25–	29–	33–	37–				
4	400	47	95	70	41	38	29	22	24	11	16	7				

TABLE 185.—*Examination a—Distribution of scores.*

Group.	Number of cases.	Score in test 10.														
		0–	4–	8–	12–	16–	20–	24–	28–	32–	36–	40				
1	571	2	1	1	28	55	104	148	128	63	36	5	.....	.....	.....	.....
		0	1–	4–	7–	10–	13–	16–	19–	22–	25–	28–	31–	34–	37–	40
2	248	0	0	0	0	9	13	27	36	56	36	40	11	17	1	2
3	176	0	0	0	0	3	4	12	26	29	33	32	18	13	5	1
5	920	112	16	21	42	85	80	157	123	120	64	51	24	15	7	3
6	260	76	35	37	26	29	21	24	3	4	0	0	0	0	0	0
		0	1–	5–	9–	13–	17–	21–	25–	29–	33–	37–	.....	.....	.....	.....
4	400	7	8	18	39	64	82	88	58	22	11	3	.....	.....	.....	.....

SECTION 2.—*Norms for examination a by age, mental age, and school grade.*

Table 186 gives the distribution of total score on examination *a* for 2,543 children enrolled in the grades below the high school. This group includes all the pupils enrolled in grades 3 to 8 (besides two classes in grade 2) in certain schools of Oakland, Palo Alto, Redwood City, Mayfield, San Jose, and Menlo Park, Calif. Chiefly form A was used, which may have given an advantage to this group since form A has been found to be slightly easier than the other forms. It will be noted that children of the age 13 to 13.9 years (average 13.5) make practically the same median score as was found for literate white men in the first four camps. (See p. 491.) In this table the distribution for the ages above 14 represent unfavorable selection.

Table 187 shows the score distributions by school grade for cases from California and Minnesota. It will be noted that the medium score of the seventh grade corresponds approximately to the median for literate white men of the first four camps.

Table 187 gives the age medians for boys and girls separately for each test of examination *a*. These medians are based on 1,162 California children, from grade 3 to the first year of high school, inclusive. For this purpose were used only schools which were thought to represent average social conditions. The group is further selected in the fact that only pupils were included both of whose parents were born in the United States. This, as well as the fact that form A was used, helps to account for the high medians, which are doubtless considerably too high to serve as representative age norms.

Table 189 gives the median score on each test of examination *a* made by school children of different mental ages and the median total score by mental age. They had been tested by the Stanford-Binet scale several months to two years before they were given examination *a*, and their mental ages at the time examination *a* was given were computed by the use of the intelligence quotient. Again the norms appear higher than the median score of literate soldiers would lead us to expect. Especially is this true above the mental age of 13 years. For the years 9, 10, 11, and 12 the mental age norms correspond closely to the norms for the corresponding chronological ages for the unselected group of 2,543 children. Above 12 years the mental age medians are higher, agreeing closely with the chronological age medians of the more selected group of 1,162 children.

The reader is left to interpret for himself the fact that school children of 13 to 14 years, or school children enrolled in the seventh grade, or school children who test at 13 by the Stanford-Binet, make about as high a score in examination *a* as does the average white recruit. The fact that form A, which is easier than the other forms, was used in most of the tests of school children, is only a partial explanation. The alpha-beta-Stanford-Binet tests of the group of 653 English-speaking recruits (see ch.7) support the findings given above as far as mental age is concerned.

Table 190 gives medians of beta tests by school grade for 597 white children of Petersburg, Va., and, for comparison, medians on the 653 English-speaking men, described in chapter 7. Table 191 shows the relationship of school grade to total weighted beta score for the group of school children shown in Table 190.

TABLE 186.—*Distributions of total score, examination a, by age, for California school children, grades 2 to 8.*

Total score.	Age (7=7 to 7.9, etc.).												
	7	8	9	10	11	12	13	14	15	16	17	18	Total.
310					1			1					2
300					0			0					0
290					0			0					0
280					1	1	3	1					6
270					1	0	2	4		1			8
260				1	1	3	8	3		0			16
250				1	1	3	6	3	2	1			17
240				1	2	3	7	10	4	1			28
230				1	5	11	21	9	3	0			50
220				0	5	10	12	16	5	1			49
210				1	5	12	10	18	7	3			56
200				3	6	16	26	13	8	0			72
190			1	4	12	24	21	16	13	3	1		95
180			0	3	18	18	18	20	16	2	0		95
170			2	4	16	28	24	22	9	4	0	1	110
160			2	8	21	22	27	19	8	2	1	2	112
150			2	19	25	32	33	14	6	5	1	0	137
140		1	5	20	31	43	24	22	7	3	1	0	157
130		4	13	17	28	30	31	13	8	4	0	0	148
120		0	7	23	40	17	20	15	9	2	0	0	133
110		3	12	25	28	22	12	6	7	2	1	1	119
100		5	19	26	26	19	12	10	5	0	0	0	122
90		7	27	26	20	23	8	10	7	0	0	0	128
80	1	9	20	29	20	11	17	7	2	1	0	0	117
70	0	15	24	38	23	14	9	5	1	0	0	0	129
60	5	22	20	29	18	14	8	2	2	1	0	1	122
50	3	22	31	24	15	7	10	3	2		1	0	118
40	1	19	40	16	20	3	4	3	1		0	0	107
30	2	26	16	18	15	6	6	1	0		0	0	90
20	2	23	23	18	11	4	5	4	2		0	1	93
10	4	22	18	11	9	1	5	4			1	1	76
0-9	6	8	7	5	3	2							31
Total	24	186	289	371	427	399	389	274	134	36	7	7	2,543
Q_1	10	27	42	60	77	108	121	129	125	137.5	57	27	70
Med.	30	47	65	89	121	146	157	170	170	160	145	115	121.5
Q_3	60	9	97	126	155	181	199	207	197	193	163	166.5	167

TABLE 187.—*Total score in examination a by school grade for 2,532 California children and 958 Minnesota children in grades 2 to 8, 558 California and Minnesota high school pupils, and 864 students of Stanford University and the University of Minnesota.*

Total score.	Pre-high school.							High school.				University.		
	2	3	4	5	6	7	8	1	2	3	4	1	2-4	Graduate.
370										1				
360										0	1	2	4	1
350									1	0	0	13	7	2
340									1	0	2	12	8	2
330									1	0	3	16	9	4
320								2	2	2	2	20	8	3
310							1	2	2	6	2	39	10	3
300					1		0	1	10	6	6	51	15	1
290					0		1	5	5	5	3	48	17	3
280					0	1	6	7	8	5	3	66	16	2
270					0	0	9	11	8	6	11	75	12	3
260					1	2	13	10	11	5	5	68	6	2
250					2	1	15	14	10	2	4	61	7	0
240					0	3	28	15	7	6	3	58	9	1
230					5	18	33	29	15	7	4	53	3	
220					7	16	36	18	14	3	0	31	2	
210					9	16	45	27	7	2	0	25	1	
200				1	8	44	42	21	11	2	1	25	2	
190				8	23	47	55	26	4	0	1	20		
180				6	26	56	61	28	9	1	2	5		
170			1	11	24	79	56	14	2	1		5		
160			1	20	53	53	52	23	4			3		
150			7	28	80	65	46	22	0			3		
140		2	11	43	84	63	37	11	1			0		
130		3	20	55	78	55	28	11	0			0		
120		1	22	61	64	56	30	5	1			1		
110		4	31	61	54	36	21	6				1		
100		5	40	53	53	27	6	2						
90		14	47	64	41	20	2	1						
80	1	21	53	45	32	11	4							
70	0	30	57	48	15	6	0							
60	3	49	46	26	3	7	2							
50	1	53	41	21	6	1	0							
40	1	61	36	10	2	0	1							
30	1	64	21	5	0	0								
20	6	69	16	4	1	2								
10	20	47	9											
0-9	18	13	4											
Total cases	54	436	463	570	672	685	630	311	134	60	53	701	136	27
Q_1	7	30	57	86	113	131	156	169	213	239	256	241	273	290
Med.	14.5	44	80	111	138	159	185	203	240	271	276	269	296	315
Q_3	25	64	106	135	159	186	216	235	275	300	304	296	323	335

TABLE 188.—*Chronological age medians for tests of examination a, Form A, based on 1,162 California children, grades 3 to 9, children of foreign parentage excluded. The first year of high school is included. Boys (B), girls (G), and sexes taken together (T).*

Examination *a*.	Age.								
	8–8.9	9–	10–	11–	12–	13–	14–	15–	16–
Test 1:									
B	4.2	4.0	4.7	6.5	5.8	7.1	7.9	7.9	8.6
G	3.3	3.8	4.8	5.5	6.3	6.9	7.8	7.4	8.6
T	3.6	3.9	4.8	6.0	5.9	7.4	7.2	7.5	8.6
Test 2:									
B	5.1	4.9	4.9	6.3	5.8	6.2	6.5	6.3	6.9
G	4.7	4.7	5.2	5.6	6.3	6.4	6.6	6.5	6.9
T	4.8	4.8	5.1	6.0	6.0	6.3	6.5	5.4	6.9
Test 3:									
B	2.3	.9	3.9	4.4	6.2	7.6	10.0	10.4	11.6
G	.9	.9	4.1	4.8	6.5	9.1	10.4	10.5	13.8
T	.9	.9	4.0	4.6	6.9	8.6	10.2	10.5	12.5
Test 4:									
B	2.4	4.3	4.1	6.7	7.2	8.8	9.0	8.8	9.9
G	1.9	3.1	4.6	5.7	6.7	7.6	8.9	9.7	8.7
T	2.1	3.6	4.4	6.2	7.0	8.2	8.6	9.0	9.3
Test 5:									
B	5.7	11.9	14.9	19.7	20.7	23.7	26.0	25.3	27.9
G	6.7	11.5	13.9	17.9	20.2	21.3	24.4	22.6	23.6
T	6.5	11.8	14.5	18.6	20.7	22.1	25.2	23.5	25.8
Test 6:									
B	1.5	2.4	4.0	6.6	9.5	12.4	15.5	17.1	17.8
G	.7	3.0	3.8	6.6	11.0	13.0	17.4	15.5	20.9
T	.8	2.6	3.8	6.6	10.4	12.7	16.2	15.8	19.5
Test 7:									
B	.7	.9	2.0	3.2	3.9	5.1	5.2	5.3	6.7
G	.7	1.4	2.9	3.1	4.3	5.2	4.7	5.5	5.8
T	.7	1.0	2.3	3.1	4.1	5.2	4.9	5.4	6.3
Test 8:									
B	2.5	1.7	2.6	3.7	4.8	5.8	8.1	6.9	9.2
G	2.3	2.0	2.8	3.0	3.8	5.4	7.5	7.3	7.9
T	2.3	1.9	2.7	3.4	4.3	5.5	7.8	7.1	8.2
Test 9:									
B	3.0	3.5	5.4	8.3	10.8	13.5	18.2	18.8	23.4
G	2.3	5.9	6.3	8.7	12	16.5	18.9	20.4	22.6
T	2.5	5.9	5.7	8.5	11.4	16	18.5	19.8	23
Test 10:									
B	7.0	9.0	12.3	14.4	16.4	18.1	18.4	18.6	22.6
G	6.8	10.1	13.6	14.9	17.7	19.9	20.8	18.9	23.2
T	6.9	9.5	12.9	14.6	17.1	18.9	18.8	18.8	22.9
Total score, sexes together	54	78	103	134	155	182	207	209	234

TABLE 189.—*Stanford-Binet mental age norms, examination a (Form A) (310 school children).*

Examination *a*.	Mental age medians (age 8—8 to 8.9).											
	8–	9–	10–	11–	12–	13–	14–	15–	16–	17–	18–	19–
Number of cases	10	37	51	41	25	35	24	23	25	17	10	12
Test 1	2.0	2.6	4.4	5.3	6.2	6.8	7.2	8.8	8.7	9.8	10.0	10.0
Test 2	3.3	4.2	5.2	5.2	6.7	4.9	5.5	6.8	6.7	7.6	6.5	9.7
Test 3	.7	.9	3.6	5.9	6.4	9.2	11.3	12.3	15.0	14.3	16.5	20
Test 4	1.5	2.6	3.5	5.5	5.9	7.4	7.8	9.5	9.5	10.2	11.5	13.4
Test 5	1.7	8.5	15.5	18.5	21.3	21.8	24.3	24.3	24.5	26.5	25.3	32
Test 6	2.3	.9	3.3	5.6	11.2	11.8	14.0	18.3	19.8	23.5	24.5	32
Test 7	.5	.6	1.3	4.1	4.3	5.4	6.0	6.2	6.4	6.6	6.5	8.5
Test 8	1.2	1.3	1.9	3.1	3.5	4.9	5.3	7.3	8.9	10.4	10.5	12.8
Test 9	.8	.9	5.8	8.4	9.5	12.8	18.0	22.7	25.3	26.8	26.3	36
Test 10	3.0	8.1	12.3	14.2	14.4	16.7	16.9	19.0	20.9	22.2	20.8	24.3
Total score	27.0	56.0	95.0	129.0	145.0	173.0	197.0	208.0	248.0	268.0	275.0	323.0
Whittier delinquents (142 cases)	26	33	45	83	110	127	137	157	(Forms B and D.)			
Indiana prisoners (256 cases)	.....	65	90	113	138	164	185	205	228	.....	.....	.....

TABLE 190.—*Medians of beta tests by school grade—597 white children, Petersburg, Va.—Beta tests.*

Grade.	Cases.	Median age.	1	2	3	4	5	6	7	8	United total (8 tests).
6	63	14.1	4.3	3.4	8.4	17.7	18.2	13.0	5.3	9.7	135
5	83	12.5	5.1	4.1	8.5	14.7	15.9	12.9	5.2	9.7	130
4	96	11.1	3.0	2.3	6.7	12.2	13.9	9.7	3.0	7.6	95
3	110	10.1	1.0	1.5	5.6	9.5	11.2	9.0	.7	6.7	73
2	116	8.9	.5	1.4	2.0	4.8	1.9	6.3	.2	4.9	42
1	129	7.6	.3	1.0	.4	1.3	.8	2.8	.2	1.0	16

Median score of unselected men on beta tests—655 English-speaking, 9 camps.

Tests	1	2	3	4	5	6	7	8
Medians	7.6	10.4	9.3	14.2	14.2	12.7	5.9	8.5

TABLE 191.—*Correlation of beta with school grade. 597 white school children of Petersburg, Va. (r=0.85)—School grade (by half years).*

Beta weighted total (8 tests).	1 B.	1 A	2 B.	2 A.	3 B.	3 A.	4 B.	4 A.	5 B.	5 A.	6 B.	6 A.	Total.
200										1			1
190										1			1
180								1			1		2
170								1	1	5	3	1	11
160						1		1	2		5	2	11
150								3	5	8	2	3	21
140							1			6	3	7	17
130						1		6	5	5	6	III	25
120				1		4	2	2	7	6	4	2	28
110					1	6	4	10	III	2	III	4	35
100					1	8	2	5	2	2	5	3	28
90					2	6	12	9	7	1	II	3	41
80				2	4	12	7	4	4	II	1	1	36
70			2	3	3	9	6	1	4				28
60			5	5	7	8	8	3	2	1		1	40
50		2	5	16	6	7	4						40
40		7	12	12	2	6	2						41
30	3	17	7	16	6	6	2						57
20	7	17	9	5	1								39
10	11	20	9	3	3								46
0–9	21	24	2	2									49
Total	42	87	51	65	36	74	50	46	44	39	34	29	597

SECTION 3.—*Correlations of tests of examination a.*

For the analysis of examination *a*, especially with reference to its revision, use was made of all available material showing the intercorrelations of the separate tests or the correlation of each with the total. In the absence of an external standard for comparison the value of such data is limited. High correlation of one test with every other, and therefore with the total, would indicate that this test is most like the total in "whatever it is that the whole examination measures," and that it is therefore the best single test to use in place of the total. It would not follow, however, that this is the most valuable test in the combination in which it appears. On the other hand, the mere fact of a low correlation of one test with the others or with the total is no indication of value unless it is known that this test correlates highly with an outside standard.

Tables 192 to 197 present intercorrelations of tests for two groups of enlisted men, one group of successful candidate officers, and two groups of college freshmen. In considering these correlations it should be remembered that the latter three groups are highly selected, and therefore have a narrower range of scores than the former two. This would affect the correlation coefficients.

Table 198 shows correlations of separate tests with total weighted scores for several types of groups. The range affects the size of the correlation coefficients; furthermore, the correlation with total score is partly determined by the weighting already assigned to each test in that total.

TABLE 192.—*Intercorrelations of tests of examination a—Three hundred and third Engineers, Camp Dix, 895 cases unselected except for rejection of 41 cases who made zero in all tests.*

Test.	1	2	3	4	5	6	7	8	9	10
1. Oral directions		0.522	0.570	0.675	0.691	0.664	0.611	0.557	0.641	0.600
2. Memory span	0.522		.443	.584	.556	.561	.510	.446	.535	.500
3. Disarranged sentences	.570	.443		.620	.664	.615	.575	.552	.628	.459
4. Arithmetical problems	.675	.584	.620		.739	.737	.604	.603	.692	.651
5. Information	.691	.556	.664	.739		.793	.606	.464	.677	.660
6. Synonym-antonym	.664	.561	.615	.737	.793		.711	.637	.746	.590
7. Practical judgment	.611	.510	.575	.604	.696	.711		.501	.621	.543
8. Number series completion	.557	.446	.552	.603	.464	.637	.501		.685	.508
9. Analogies	.641	.535	.628	.692	.677	.746	.621	.685		.533
10. Number comparison	.600	.500	.459	.651	.660	.590	.543	.508	.533	
Average	.615	.517	.579	.656	.690	.673	.597	.550	.640	.560

TABLE 193.—*Intercorrelations of tests of examination a—Battery B, Three hundred and thirteenth Field Artillery, Camp Dix, 172 cases.*

Test.	1	2	3	4	5	6	7	8	9	10
1. Oral directions	.....	0.47	0.49	0.61	0.66	0.59	0.55	0.61	0.56	0.51
2. Memory span	0.47	.....	.36	.48	.53	.44	.42	.30	.47	.42
3. Disarranged sentences	.49	.36	.....	.58	.57	.69	.51	.54	.53	.44
4. Arithmetical problems	.61	.48	.58	.....	.66	.68	.57	.52	.62	.58
5. Information	.66	.53	.57	.66	.....	.75	.79	.45	.66	.57
6. Synonym—antonym	.59	.44	.69	.68	.75	.....	.68	.55	.67	.53
7. Practical judgment	.55	.42	.51	.57	.79	.68	.....	.42	.60	.55
8. Number series completion	.61	.30	.54	.52	.45	.55	.42	.....	.54	.43
9. Analogies	.56	.47	.53	.62	.66	.67	.60	.54	.....	.48
10. Number comparison	.51	.42	.44	.58	.57	.53	.55	.43	.48	.....
Average	.56	.43	.52	.59	.63	.62	.57	.48	.57	.50

TABLE 194.—*Intercorrelations of tests of examination a—Second reserve officers' training camp, Fort Snelling, 213 successful candidates.*

Test.	1	2	3	4	5	6	7	8	9	10
1. Oral directions	.....	0.271	0.234	0.383	0.257	0.409	0.192	0.281	0.385	0.084
2. Memory span	0.271	.....	.123	.247	.212	.200	.176	.271	.275	.009
3. Disarranged sentences	.234	.123	.....	.388	.427	.553	.169	.407	.505	.137
4. Arithmetical problems	.383	.247	.388	.....	.439	.463	.283	.463	.467	.203
5. Information	.257	.212	.427	.439	.....	.583	.268	.281	.624	.188
6. Synonym—antonym	.409	.200	.553	.463	.583	.....	.214	.383	.601	.204
7. Practical judgment	.192	.176	.169	.283	.268	.214	.....	.267	.246	.131
8. Number series completion	.281	.271	.407	.463	.281	.383	.267	.....	.451	.234
9. Analogies	.385	.275	.505	.467	.624	.601	.246	.451	.....	.138
10. Number comparison	.084	.009	.137	.203	.188	.204	.131	.234	.138	.....
Average	.277	.198	.327	.371	.364	.401	.216	.338	.410	.148

TABLE 195.—*Intercorrelations of tests of examination a—Male freshmen, University of Minnesota, 201 cases.*

Test.	1	2	3	4	5	6	7	8	9	10
1. Oral directions	.....	0.255	0.273	0.200	0.327	0.318	0.073	0.189	0.389	0.241
2. Memory span	0.255	.....	.250	.225	.125	.274	.023	.284	.272	.191
3. Disarranged sentences	.273	.250	.....	.288	.510	.557	.081	.271	.422	.034
4. Arithmetical problems	.200	.225	.288	.....	.333	.285	.214	.409	.404	.207
5. Information	.327	.125	.510	.333	.....	.665	.170	.207	.305	.118
6. Synonym—antonym	.318	.274	.557	.385	.665	.....	.248	.306	.379	.132
7. Practical judgment	.073	.023	.081	.214	.170	.248	.....	.225	.170	.028
8. Number series completion	.189	.284	.271	.409	.207	.306	.225	.....	.565	.119
9. Analogies	.389	.272	.422	.404	.305	.379	.170	.565	.....	.171
10. Number comparison	.241	.191	.034	.207	.118	.132	.028	.119	.171	.....
Average	.252	.211	.298	.296	.307	.352	.137	.286	.342	.138

TABLE 196.—*Intercorrelations of tests of examination a—Female freshmen, University of Minnesota, 209 cases.*

Test.	1	2	3	4	5	6	7	8	9	10
1. Oral directions	.....	0.301	0.172	0.094	0.049	0.162	0.119	0.262	0.133	0.021
2. Memory span	0.301	.....	.248	.076	.170	.128	.035	.154	.199	.00
3. Disarranged sentences	.172	.248	.....	.246	.246	.377	.044	.317	.350	.148
4. Arithmetical problems	.094	.076	.246	.....	.146	.147	.052	.236	.136	.262
5. Information	.049	.170	.246	.146	.....	.504	.176	.117	.450	.190
6. Synonym—antonym	.162	.128	.377	.147	.504	.....	.042	.135	.486	.001
7. Practical judgment	.119	.035	.044	.052	.176	.042	.....	.042	.099	.119
8. Number series completion	.262	.154	.317	.236	.117	.135	.042	.....	.302	.152
9. Analogies	.133	.199	.350	.136	.450	.486	.099	.302	.....	.237
10. Number comparison	.021	.00	.148	.262	.190	.001	.119	.152	.237	.....
Average	.146	.146	.239	.155	.228	.220	.081	.191	.266	.126

TABLE 197.—*Rank order of tests of examination a according to average intercorrelation with other nine tests.*

Test.	Unselected groups.				High-grade groups.			
	Dix unselected (895 cases).	Dix Field Artillery (172 cases).	National Guard[1] (313 cases).	Combined order for unselected men.	Fort Snelling reserve officers' training camp (213 successful candidates.)	University of Minnesota (201 male freshmen).	University of Minnesota (209 female freshmen).	Combined order for high-grade groups.
1. Oral directions	5	6	4	4.5	7	7	7.5	7
2. Memory span	10	10	10	10	9	8	7.5	8
3. Disarranged sentences	7	7	6.5	7	6	4	2	4
4. Arithmetical problems	3	3	2.5	3	3	5	6	5
5. Information	2	1	1	1	4	3	3	3
6. Synonym—antonym	1	2	2.5	2	2	1	4	2
7. Practical judgment	6	4.5	5	6	8	10	10	9.5
8. Number series completion	9	9	9	9	5	6	5	6
9. Analogies	4	4.5	6.5	4.5	1	2	1	1
10. Number comparison	8	8	8	8	10	9	9	9.5

[1] Reported on p. 316.

TABLE 198.—*Correlation of each test of examination a with total weighted score.*

A. DRAFT GROUPS UNSELECTED.

	1	2	3	4	5	6	7	8	9	10
Devens (400 cases)	0.639	0.643	0.559	0.842	0.826	0.889	0.645	0.750	0.849	0.746
Lee (431 cases)	.76	.62	.76	.83	.92	.86	.61	.70	.71	.73
Taylor (109 cases)	.69	.53	.66	.81	.84	.77	.75	.58	.75	.66

B. SPECIAL GROUPS, SUPERIOR TO DRAFT GROUPS.

Devens (176 sergeants)	0.626	0.405	0.742	0.597	0.813	0.794	0.544	0.700	0.796	0.405
Dix (249, officers' training camp)	.698	.533	.741	.767	.784	.819	.612	.779	.859	.542
Snelling (reserve officers' training camp)	.514	.350	.735	.705	.749	.741	.445	.618	.767	.340
College freshmen:										
Male	.428	.500	.699	.592	.719	.791	.355	.601	.789	.432
Female	.274	.481	.603	.406	.642	.651	.368	.499	.679	.438

SECTION 4.—*Practice effects in examination a.*

The problem of the effect of practice in connection with the Army examinations has received little attention. A certain amount of data was available on examination *a*, secured for the most part either through chance or in connection with the problem of reliability, but none were obtained on alpha and beta. For the Army situation the question of practice effect was, in fact, very nearly negligible, since pressure of demands made it imperative that there be the minimum of duplication of work. Occasionally men received from other camps or transferred within a given camp were reexamined, but this was not a sufficiently usual occurrence to affect the mass results and the comparison of groups. Moreover the results of the first examination were entered on the man's qualification card and frequently on his service record, and were therefore available.

The chief difficulty arose in connection with officers and candidate officers. The former were fairly frequently reexamined on transfer to a new camp; the latter were even more likely to be given a second examination, receiving their first with the group of enlisted men and their second with the officers' training camp group. In both cases it was possible to obtain the man's first record from his qualification card. It was only a question of taking the time to look this up, which was a fairly time-consuming task. The data presented herewith show that it was a matter of importance that second examination be not used interchangeably for first. The sources of data available on the effect of repetition of examination *a* are as follows:

	Cases.
Enlisted men, Devens and Dix	190
Third officers' training camp, Devens	331
Third officers' training camp, Taylor	225
Officers, Devens	202
School children, Oakland, Calif.	324

It is not to be expected that these several groups should give the same results, since data were not obtained under constant conditions. There was variation in the time intervening between examinations, in the forms of examination *a* which were used, and in the general intellectual level of the groups examined. Such of the conditions as are known regarding the groups are given for their bearing on interpretation of the results.

The group of enlisted men from Devens and Dix was examined as part of an investigation undertaken in response to instructions issued October 13, 1917. These instructions specified that the two examinations be given on succeeding days, that forms A and C be the two forms used, and that A precede C for half the group and follow for the other half. This procedure would obviously tend to neutralize the effect of differences in difficulty of the forms. The group showed a wide distribution over the whole scale, the mean falling toward the lower limit of grade C.

In case of the two officers' training camps the reexamination was incidental to the examination of candidate officer groups. The cases here considered had been examined previously in the general camp survey. The periods intervening between the two examinations were therefore variable, ranging for the most part from one to three months. Both groups were highly selected, their means falling in grade B and their distributions covering a range from C to A, inclusive, with a few scattering cases in C−. For the Taylor group no information is given concerning forms used. With the Devens group all five forms had been used for the first examination, but form C was used exclusively in the second. The following data show the mean gain in score, summarized with reference to form used in first examination:

Form used in first examination	A.	B.	C.	D.	E.	Not known.	All forms.
Number of cases	69	67	53	60	74	8	331
Mean gain	19.9	19.9	28.4	36.0	44.3	36.4	30.0

These data indicate that the amount of gain is influenced to an appreciable degree by the form used. Taking the above figures at their face value the indications are that forms A and B[1] are easier than forms D and E. (The case of form C is ambiguous because of repetition of the identical form of examination.) In any case figures based on such small numbers of cases should not be stressed unduly. Their importance consists especially in the indication of difference in form of examination as an important variable in this connection.

The Devens officer group consists of cases who were tested in the course of examination of officers as a group, but who had previously taken the examination under varying conditions largely for the purpose of familiarizing themselves with the methods. The group was even more highly selected than the officers' training camp groups, having its mean in A and with a distribution ranging from C+ to A, inclusive, with four scattering cases in C. Variable periods had intervened between examinations, for the most part probably from one to three months. No information was at hand regarding forms used.

The Oakland school children were fourth to eighth grade pupils, and accordingly varied widely in actual age. This makes significance of results very uncertain as applied to adults. In the first trial forms B, C, D, and E were used; in the second trial form A exclusively. Since present evidence indicates that form A is easier than the other forms used, the degree of gain was probably exaggerated to some extent for this group. Examinations were given on successive days. Cases fell mainly in the lower range of the scale, probably because of the fact that these were not adults, so that the various grades do not retain their usual significance. The range of distribution for the group was from E to C+, inclusive, with the mean falling in C−.

Table 199 presents comparative data for the various groups on the two examinations:

[1] Scores in form B had been given the regular addition of 13 points. See p. 318.

TABLE 199.—*Comparison of results by first and second trials—Examination a.*

Statistical data.	Group.				
	Enlisted men.	Devens, officers' training camp.	Taylor, officers' training camp.	Devens, officers.	School children.
Number of cases	190	331	225	202	324
Mean:					
First trial	155.6	283.5	278.6	313.3	112.6
Second trial	180.5	313.4	312.0	330.2	152.0
Mean gain	24.9	29.9	33.4	16.9	39.4
Percentage of gains	79.5	90.9	90.2	74.7	91.1
Percentage of losses	7.4	8.5	4.9	19.3	2.7
Percentage same	13.2	.9	4.9	5.9	6.2
r (first and second trial)	.97	(1)	.84	(1)	.90

[1] Not computed.

All groups show a high percentage of cases who improved their scores on second examination, varying in the different groups from 75 per cent to 91 per cent. The mean gain in score varies from 16.6 for the officer group to 39.4 for the school children. The relatively small amount of gain in the officer group is largely attributable to the high initial scores of this group. (It may be noted that 19.3 per cent of this group actually made lower scores than in their first examinations.) We have already noted the circumstances with regard to examination forms which made for somewhat exaggerated gains in case of the group of school children. Owing to the uncertainties connected with this group we shall disregard it in the remaining discussion. The correlation coefficients (Pearson product moment) are given where these have been computed, though the significance of these is more directly related to the problem of reliability than to that of practice effects.

Inspection of the scatter tables for the various groups shows that there is not an even gain over the whole range. For the two officers' training camp groups correlations were computed between score in the first examination and change in score on second examination. The correlation coefficients were both negative: Devens, $r = -0.476$; Taylor, $r = -0.38$. In other words, there is reduction in gain toward the upper part of the intelligence scale. As a further check on the relationship of position on the scale to amount of gain we have computed the mean gain for cases making given letter grades on their first examinations. These are given in Table 200. (Where the number of cases in any letter grade was very small the figures have been omitted and the number of cases indicated in parentheses.)

TABLE 200.—*Mean gain on second trial of groups classified by grade made on first.*

Military group.	Grade in first examination.							
	E.	D.	C−.	C.	C+.	B.	A.	All grades
Enlisted men:								
Number of cases	30	22	35	46	25	17	15	190
Mean gain	10.7	26.8	24.0	26.3	31.3	39.4	20.7	24.9
Devens, officers' training camp:								
Number of cases			(3)	26	55	105	142	331
Mean gain				37.3	46.8	33.2	21.5	30.4
Taylor, officers' training camp:								
Number of cases			(1)	14	44	83	83	225
Mean gain				40.0	53.9	35.3	19.3	33.4
Devens, officers:								
Number of cases				(4)	(9)	53	136	202
Mean gain					31.1	27.2	11.6	16.9

In the light of the facts which we have stated regarding variations in conditions it would be unprofitable to discuss the detailed differences which appear between the different groups. Several facts, however, stand out rather prominently:

(1) The amount of gain does not decrease steadily toward the upper part of the scale as the correlation coefficients of score in first examination with gain may have implied. Instead, the gain is apparently least at the two extremes, but, aside from this, reaches its maximum toward the upper end in either the C+ or the B range.

(2) There is a distinct drop in gain for the A cases in all groups.

(3) The E cases also make a very slight mean gain in the one group where such cases appear.

It is important also to note the gain by grades—i. e., the per cent of E men raising their grades to D, of D to C−, etc. Table 201 shows in summary form the grade changes:

TABLE 201.—*Changes in grade on second examination in comparison with grade on first.*

Grade change.	Enlisted men (190).	Devens, officers' training camp (331).	Taylor, officers' training camp (224).	Devens, officers (202).
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*
Same grade	56.3	58.3	50.7	73.3
One grade higher	40.5	34.1	41.8	22.7
Two grades higher	2.1	6.9	6.2	.....
One grade lower	1.1	.6	1.3	3.9

SECTION 5.—*Equivalence of forms, examination a.*

On the basis of the original standardization of examination *a*, scores on form B were at all times increased by 13. In the following discussion, form B scores have always received this addition. There is no suggestion in any data bearing on differences among the five forms of examination *a* that form B was thus made relatively too easy.

Within a few weeks after examining was begun the equality of the forms of examination *a* was called in question by a report from Camp Lee. "The data indicate," it was stated "not only that the E form is more difficult than the others, but also that the forms increase progressively in difficulty from A to E."

A letter was accordingly sent to the chief psychological examiners at Camps Devens, Dix, Lee, and Taylor, asking that similar data be tabulated and forwarded as promptly as possible. Camp Dix sent the statement that the groups taking each form among the Three hundred and third Engineers gave evidence of "a large variation between forms, form A being the highest, form E the lowest, and B, C, and D in between, the latter three being of approximately the same difficulty. Although these totals in general are in accordance with the results from other camps, large differences in the performances of those taking form A and those taking form E on tests 2 and 10 (tests in which the performance should be quite independent of the contest) would indicate an actual difference in intelligence between the groups."

Camp Devens sent distributions for two groups, Camp Lee for a second group, and Camp Taylor for one group. There is, in addition, a record of the medians and quartiles of a combined group (Nashville, Syracuse, Indiana, and the Mosquito Fleet) from the preliminary summer examining. These are summarized in Tables 202 to 212:

TABLE 202.—*Camp Devens, first group.*

Number of cases.	Form.	Q_1.	Med.	Q_3.	Percentage distribution of grades.				
					E.	D.	C.	B.	A.
1,170	A	137	185	235	0.25	10.0	70.5	11.4	7.7
1,101	B	126	170	230	.27	12.7	69.3	11.7	6.5
1,095	C	120	168	232	.46	15.5	64.7	12.4	6.8
1,271	D	133	180	232	.24	9.5	70.6	12.7	6.6
1,080	E	132	179	234	.37	12.0	68.0	12.7	6.9

TABLE 203.—*Camp Devens, second group.*

Number of cases.	Form.	Q_1.	Med.	Q_3.	Percentage distribution of grades.				
					E.	D.	C.	B.	A.
1,118	A	133	184	241	0.80	13.0	64.0	14.0	8.5
818	B	142	192	252	.12	8.9	65.5	14.0	11.4
1,083	C	134	183	248	.20	10.3	64.7	16.2	8.5
1,139	D	145	207	269	.09	6.6	61.1	18.2	14.0
1,065	E	116	159	211	.28	16.6	69.5	9.3	4.2

TABLE 204.—*Camp Devens, groups combined.*

Number of cases.	Form.	Q_1.	Med.	Q_3.
2,288	A	134	183	237
1,919	B	131	177	236
2,178	C	125	166	239
2,410	D	141	191	250
2,145	E	123	169	224

TABLE 205.—*Camp Dix group.*

Number of cases.	Form.	Rank.
189	[1] A	[2] 1
268	B	3
136	C	3
173	D	3
155	[1] E	[3] 5

[1] Form A group much excelled form E group on tests 2 and 10 and was therefore considered to be a more intelligent group.
[2] Easiest.
[3] Hardest.

TABLE 206.—*Camp Lee, first group.*

Number of cases.	Form.	Q_1.	Med.	Q_3.	Percentage distribution of grades.				
					E.	D.	C.	B.	A.
1,013	A	84	149	201	10.2	18.4	59.6	8.0	3.7
563	B	79	132	185	8.5	26.6	54.7	5.5	2.8
894	C	58	122	182	14.2	25.2	50.4	7.6	2.5
797	D	66	114	172	17.4	25.2	49.6	5.6	1.6
1,331	E	59	101	155	25.7	23.9	45.9	3.2	1.1

TABLE 207.—*Camp Lee, second group.*

Number of cases.	Form.	Q_1.	Med.	Q_3.
776	A	104	159	224
862	B	83	135	189
981	C	99	156	216
1,220	D	95	152	213
976	E	63	112	163

TABLE 208.—*Camp Lee, first and second groups combined.*

Number of cases.	Form.	Q_1.	Med.	Q_3.
1,779	A	97	153	198
1,925	B	82	133	188
1,875	C	84	139	202
2,017	D	79	136	199
2,307	E	61	105	158

TABLE 209.—*Camp Taylor.*

Number of cases.	Form.	Med.	Percentage distribution of grades.				
			E.	D.	C.	B.	A.
3,699	A	171	5.8	14.2	61.7	10.9	6.2
4,162	B	143	5.3	21.3	63.5	7.1	3.6
4,732	C	173	5.6	12.0	62.0	12.8	6.9
2,263	D	173	5.5	15.7	67.1	8.3	3.1
119 [1]	E	174	0.0	9.2	79.1	16.0	5.0

[1] Absence of E grades indicates that this small group was decidedly superior in intelligence.

TABLE 210.—*Devens, Lee, Taylor, combined—Average per cent making each grade.*

Form.	E.	D.	C.	B.	A.
A	4.26	11.4	64.0	11.1	6.5
B	3.55	17.4	63.3	9.6	6.1
C	5.12	15.8	60.5	12.3	6.2
D	5.81	14.3	62.1	11.2	6.3
E	6.59	15.4	63.4	10.3	4.3

TABLE 211.—*Nashville, Syracuse, Indiana, and Mosquito Fleet—Trial experiment.*

Number of cases.	Form.	Q_1.	Med.	Q_3.
1,030	A	109	180	252
910	B	82	167	217
490	C	97	171	204
275	D	166	186	251
531	E	69	131	180

TABLE 212.—*Summary.*

	Devens (1).	Devens (2).	Lee (1).	Lee (2).	Nashville, etc.	Taylor.	Average of medians.	Range of medians.
A	185	184	149	159	180	171	171	149–185
B	170	192	132	135	167	[1] 143	156	132–192
C	168	183	122	156	171	173	162	122–183
D	180	207	114	152	186	173	152	114–207
E	179	[1] 159	101	112	131	174	143	101–179

[1] Known to be poor groups.

It would hardly be safe to assert the existence of considerable differences between forms on the basis of the data. It appears, however, that forms B and E are more difficult than the others, and that form A is easiest; but when it is remembered that in one of the four groups furnishing the final table the form E group was characterized on other grounds as "poor," and that in another case the same is said of a form B group, the figures seem inconclusive. The differences in the character of the groups examined all but obscure the differences due to relative difficulty of forms.

NATIONAL ACADEMY OF SCIENCES

Volume XV

PSYCHOLOGICAL EXAMINING IN THE UNITED STATES ARMY

Part III

MEASUREMENTS OF INTELLIGENCE IN THE UNITED STATES ARMY

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INTRODUCTION TO PART III.

The preparation of this part of the report was directed by Capt. E. G. Boring, who also planned and superintended the statistical analysis of data of examination by means of the Hollerith system, directed the preparation of the manuscript for Part III, and took an important share of responsibility in preparing the entire manuscript of the report for press.

Assistance in the preparation of Part III was rendered by Maj. W. S. Foster, who wrote accounts of segregation and tests of literacy, officers' opinions concerning values of intelligence ratings, and varieties of psychological service; by Capt. R. M. Elliott and Lieut. J. T. Metcalf, who brought together material bearing on the intelligence of the negro; by Capt. D. G. Paterson, who prepared the data on the relation of intelligence to occupation; by Dr. J. W. Bridges, who prepared the accounts of the materials of the performance scale and of the abbreviations of the several forms of individual examination; by Miss Cobb, who assembled reports on literacy and schooling, and on organization of the camps; by Lieut. M. A. May, who brought together the information on conscientious objectors and on the time element in the alpha examination, and who, with Mr. Brown, was concerned primarily with mathematical aspects of this report; and by Lieut. E. A. Lincoln, who contributed numerous reports on the differentiation of intelligence ratings with respect to various factors. Further details concerning the responsibility for work on Part III will be found in section 4 of chapter 1, page 570.

It proved utterly impossible, for the reasons already indicated in the general introduction to this report, to satisfactorily analyze and completely present even the obviously important data resulting from psychological examination of nearly 2,000,000 men in the United States Army. Original records of examination are preserved by the War Department, and it is possible that it may prove feasible at some time to make more thoroughgoing and intensive use of them for scientific purposes.

ROBERT M. YERKES,
Lieutenant Colonel, U. S. R.

WASHINGTON, D. C., *May 15, 1920.*

PSYCHOLOGICAL EXAMINING IN THE UNITED STATES ARMY.

Part III.—MEASUREMENTS OF INTELLIGENCE IN THE UNITED STATES ARMY.

CHAPTER 1.

SAMPLING OF INTELLIGENCE RECORDS AND MODE OF ANALYSIS.

SECTION 1.—*The principal sample.*

In view of the fact that nearly two million psychological record cards were returned from the camps to the Office of the Surgeon General it became necessary, for the statistical summary of the results of examining, to select a considerable sample for analytical treatment. A sorting of the entire group of cards would have been impossible with the facilities available and would, moreover, have added little to the value of the results. The entire group is, after all, by no means a random group, but depends upon such chance conditions as the particular camps in which examining was progressing, the draft quotas sent to those camps, and many other minor considerations that affected the numbers of examinations given to different classes of recruits.

The problem of selecting a sample is obviously twofold. In the first place it is necessary to obtain as far as possible a sample that is truly representative of the group under consideration—in this case the drafted recruits of the United States Army. When the total group is affected by such chance conditions as we have mentioned the sample must be chosen so as, if possible, to be more representative than the total set of records.

The second phase of the problem of sampling is the determination of the number of cases in the sample. With respect to the reliability of results based upon a particular sample a law of diminishing returns applies, for with equal added increments less and less increase of reliability is acquired. Mathematically, the precision of data increases only as the square root of the number of cases. There is no way of settling a priori upon the total number of cases for any given sample. The greater the number of cases the more precise the data and the smaller the differences that can subsequently be made out from it, but gross differences can be reliably based upon a very few cases only. Since the comparisons can be made only subsequently to the selecting of the sample, the safe rule is to choose as large a representative group as is practicable under the circumstances and to trust that it will prove itself a reliable basis for such conclusions as may later be indicated. Thus it was planned to select a sample of approximately 100,000 records as representing white recruits in the draft Army and additional samples for negroes, officers, and enlisted men of stages of military training more advanced than that of the recruit.

The ideal sample of data is the "random" sample. The selection of a "random" sample, however, requires, paradoxical as it may seem, great pains and much planning. The psychological record cards received in Washington from the camps came in various sorts of files. Some cards were arranged apparently without rule by companies; others were alphabetized by companies; others were in large alphabetical files for total draft quotas, or even, in some cases, for the total period of examining in the camp. Very often the individual examinations were separated from the other examinations; sometimes even they were kept in separate files. Occasionally alpha and beta examinations were separate. There was varied practice as to the inclusion of negro recruits in the same files with the white. The cards unfortunately were none of them dated, so that it was not always possible in the case of separation of files to find the set

of individual examinations that belonged with a given set of group examinations. It is evident that the selection of a representative sample from such data could be done only by the scrutiny of every card and by a careful checking of the numbers of the various types of examinations against such records of these numbers as happened to be available. Very often it occurred that the relative numbers of the different types of examination taken from a file that gave every evidence of being complete would not tally very closely with the corresponding figures in the weekly reports from the camp. In such cases the cards for the sample were taken in the frequencies in which they were found (or in the case of a small sample in the frequencies in which they occurred in a larger group). Such discrepancies are quite possibly to be accounted for by the fact that the weekly reports could never be exactly identified with a group of undated cards.

In order to fix certain of the conditions of sampling and to meet in part the difficulties arising from the varying constitution of the groups reported by the different camps, it was decided to separate the principal sample into the four main groups mentioned above, viz, the white draft (representative of the greater part of examining), the negro draft, the selected group of white officers, and the more or less selected group of men already established in training in permanent divisional or other military organizations. Hence, in selecting cards, attention had always to be paid to the group in which the card belonged, although, fortunately, in many camps separate files had been kept for these four divisions.

The principal sample for the white draft, as well as that for the negro draft, is intended to provide a group that shall be representative of the draft from the country at large. Since it was necessary to select particular camps from which the cards should be drawn and since these camps had a somewhat abnormal geographical distribution which was in turn cut across by some unusual assignments of draft quotas, it was decided to pull from the records a large number of cards in accordance with the State from which the men had been drafted. From May to August, 1918, psychological examiners had been instructed to place on the back of every psychological record card the home town and State of the recruit, and it was in accordance with these entries that the geographical selection by State was made. The discontinuance of the rule for entering the recruit's residence necessitated the selection of all cards in these geographical groups from the period of examining prior to the middle of August, 1918. In other groups the cards may, and frequently do, come from later periods. It was not possible to select all the cards in the same period of time, because in some cases sufficient numbers were not available.

The general rule for selection of records from the files in the case of an alphabetical arrangement was to pull cards from different parts of the alphabet, most usually by taking an equal number from the front of every file box (a file box contains about 2,000 cards). After the requisite number of cards had been obtained in a particular case the numbers taking examination alpha only, examination beta only, alpha and beta together, and any form of individual examination were counted separately and compared with such statistical or general data as were available for that camp. For example, a failure to find alpha-beta records should have meant that the camp at some time or other was unable to recall men from alpha to beta. Absence of records of individual examination most frequently meant that the cards had been filed elsewhere. In such a case the additional file was located, cards of the same group were isolated when feasible, and a sufficient number of individual records added to the group already pulled to make a fair sample. The number of individual records was determined either by the weekly reports from the camps or, when the total group could be isolated both for group examinations and individual examinations, by estimating the number of cards in each part and prorating. When this course was necessary, small batches of cards were counted by hand, large batches were counted by placing the cards under compression and measuring—there are almost exactly 100 cards to the half inch.

When discrepancies between actual findings in the files and office records were great an effort was made to secure other samples and thus avoid the possibility of error. For example, the records for Camp Sherman were abandoned entirely in the case of draft quotas because no individual examinations could be found to go with the group examinations. On the other hand,

it was necessary in some cases to admit cards from complete alphabetical files in which the percentage of individual examinations varied considerably from the average reported from the camp. The errors arising from such discrepancies are probably not great, since the individual examinations are few in comparison with the total group. Errors of this order do exist, however, and must be kept in mind as bearing upon the precision of the data.

In counting the cards to make up a single sample and in determining the relative numbers of the different types of examination, the counts were made rapidly by hand with the aid of rubber finger tips. All the counting and selection of cards was done by a single officer and an assistant. It is no small task thus to select 160,000 cards. Only rarely can most of the consecutive cards in a file be taken for a single group. Very often it is necessary to leaf over several thousand cards in order to find a bare fifty or a hundred. Usually every card had to be handled several times; once, say, to make the selection by States (written on the back), again perhaps to exclude negroes or noncommissioned officers or privates who were not recruits, and then finally to make the count of different types of examination. This counting was so time-consuming that it proved impracticable to check the numbers, and many differences between desired totals and the totals actually appearing in the tables of sortings are due undoubtedly to errors in the original selection. These errors are as a matter of fact of no serious moment. They are always small because a rough check was exercised by measuring the piles or by placing successive piles of 100 cards alongside of one another and noting an equivalence of height.

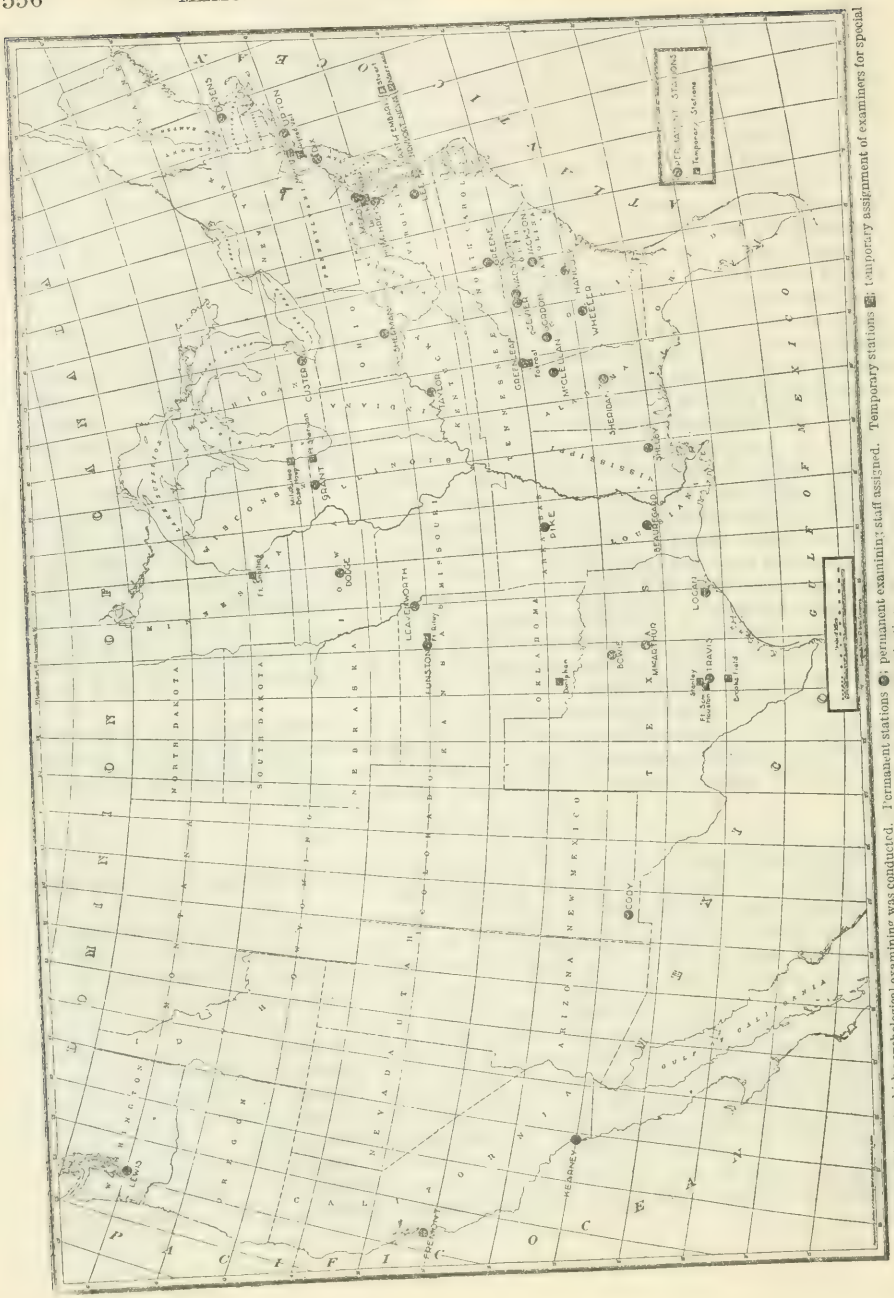
An additional source of error lies in the uncertainty of the meaning of the State-name written on the back of the card. It was intended that this entry of State should represent the State from which the recruit was drafted, but in one camp at least it is known that State of birth was written instead. In some other files disparity of procedure seemed to exist, for in some cases the State written on the back of the card would differ from the State entered under birthplace on the front of the card, while in other cases in the same file the entry on the back of the card would be the name of some foreign country, obviously an entry of nativity and not of residence. It is thought that this error is perhaps also not large when compared with other forced errors of selection that occurred later; for example, the failure to find any cards at all for Arizona and but few for Florida.

A description of groups is given below in section 2. A map, showing the geographical significance of the various camps at which psychological examining was done, is presented herewith. It must be remembered, however, that the camps did not draw entirely in the draft from adjacent territory, although such had been the original plan.

Section 2.—*Description of groups.*

The principal sample for Hollerith analysis was divided, as indicated above, into eight main groups. The description of these groups follows:

Group I: white draft, pro-rated, by States.—This group is intended to represent the draft of the United States at large. It was selected from 15 camps which were, with one exception, the National Army camps in which examining was firmly established at an early date and to which the greater part of the draft was assigned. These camps are: Custer, Devens, Dix, Dodge, Funston, Gordon, Grant, Lee, Lewis, Meade, Pike, Taylor, Travis, Upton, and Wadsworth. The camps in themselves show a wide geographical scatter and it was thought at first that this distribution would render a sample, selected with equal increments from every one of the camps, representative of the country. It was found, however, that there were many of unexpected assignments (e. g., Camp Wadsworth had mostly Pennsylvania men) which would leave some section of the country totally unrepresented and some other section unduly weighted. For this reason it was decided to pro-rate in proportion to the male population of the States as given in the census of 1910. Inspection of the records indicated that it might be difficult or impossible to obtain a sample on this method of selection that was larger than 40,000 or 50,000 cards.



Map, showing locations at which psychological examining was conducted. Permanent stations ●; permanent examining staff assigned. Temporary stations ■; temporary assignment of examiners for special examinations.

TABLE 1.—*Group I: White draft, pro-rated, by States.*

Numbers of cases in Group I of the principal sample. Figures show for every State numbers taking each examination, the actual total number selected for the State, and the desired total on a pro-rata basis of 1 per 1,000 white male population in 1910. The last column gives the total for Groups I and II (cf. Table 2) taken together. These figures are the maxima available for any one State.

State.	Examination taken.				Camp at which examined.	Total Group I.	Prorata 1:1,000 white males.	Total Groups I and II.
	Alpha only.	Alpha-beta only.	Beta only.	All individuals.				
Alabama	435	56	123	16	Pike	630	626	1,14
Arizona	0	0	1	0		1	101	1
Arkansas	345	55	155	31	Pike	586	586	1,06
California	851	125	230	27	Lewis	1,233	1,233	1,233
Colorado	353	19	38	9	Travis	419	421	769
Connecticut	439	28	61	30	Devens	558	556	1,004
Delaware	79	0	7	2	Dix	88	87	147
District of Columbia	77	0	36	0	Meade	113	115	113
Florida	47	3	7	2	Pike, 24; scattered, 35	59	233	59
Georgia	509	43	175	0	Gordon	727	724	1,001
Idaho	144	20	14	1	Lewis	188	181	1,008
Illinois	2,056	82	671	21	Grant	2,830	2,852	2,830
Indiana	1,169	0	150	31	Taylor	1,350	1,352	1,350
Iowa	979	47	101	14	Pike	1,141	1,140	1,141
Kansas	722	17	112	8	Funston	859	856	1,000
Kentucky	832	5	183	10	Taylor	1,030	1,030	1,030
Louisiana	390	37	128	10	Pike	475	480	1,000
Maine	251	51	55	19	Devens	376	376	999
Maryland	336	1	193	4	Meade	534	529	1,001
Massachusetts	1,132	105	298	27	Devens	1,562	1,633	1,562
Michigan	1,095	101	211	38	Custer	1,445	1,441	1,445
Minnesota	719	63	311	6	Grant	1,099	1,099	1,099
Mississippi	250	36	83	21	Pike	390	402	990
Missouri	1,227	87	279	15	Funston	1,608	1,607	1,608
Montana	136	1	82	0	Dodge	219	218	998
Nebraska	408	2	212	1	do	623	621	1,005
Nevada	35	10	3	3	Lewis	51	48	118
New Hampshire	149	24	53	14	Devens	240	216	1,034
New Jersey	877	59	304	4	Dix	1,244	1,241	1,244
New Mexico	53	11	72	24	Travis	140	163	574
New York	2,843	450	1,030	78	Upton	4,401	4,511	4,401
North Carolina	471	57	153	81	Wadsworth	762	755	1,006
North Dakota	241	15	56	4	Custer	316	314	1,004
Ohio	2,318	0	68	6	Taylor	2,392	2,376	2,392
Oklahoma	513	130	73	38	Travis	754	772	980
Oregon	291	47	26	4	Lewis	368	370	995
Pennsylvania	3,089	177	332	99	Wadsworth	3,697	3,844	3,697
Rhode Island	200	20	41	14	Upton	275	265	1,016
South Carolina	161	16	123	44	Wadsworth	344	344	992
South Dakota	223	0	78	0	Funston	301	307	995
Tennessee	584	50	218	9	Gordon	841	870	974
Texas	1,169	221	106	114	Travis	1,670	1,671	1,670
Utah	134	40	11	5	Lewis	190	192	864
Vermont	144	13	17	11	Devens	185	181	1,007
Virginia	382	4	0	0	Lee	386	704	683
Washington	497	70	68	9	Lewis	644	635	1,028
West Virginia	263	4	317	26	Meade	610	607	999
Wisconsin	988	2	197	15	Grant	1,202	1,202	1,202
Wyoming	71	18	0	13	Lewis	102	87	588
Total	30,567	2,431	7,322	958		41,278	42,174	55,962

Accordingly the ratio of one recruit per thousand white male population was determined upon as the basis. It was not possible to provide for any scattering of cards within a particular State, except in the case of the few largest States. New York State, for example, was divided into New York City, Lackawanna County (the industrial region of Buffalo), and the remainder of the State, and cards were pulled proportionately for these three sections. Table 1 is an analysis of Group I. The total numbers for Group I are shown in the third column from the right; the pro-rated numbers in the second column from the right. It will be noted that the discrepancies between the two columns are in most cases not great. They are probably due to errors in counting (vide supra) and in some cases to an accidental inclusion of alternate cards that had been saved for emergencies. The large shortages in the cases of Arizona, Florida, Pennsylvania, and Virginia are due to a failure to find cards in sufficient quantity in the files. This failure does not mean that men from these States were not examined, but merely that their home States were not recorded on the back of their cards, either because of some mistake in camp procedure or because they were examined after the discontinuance of the rule for entering the address. At Camp Lee the home State was never entered on the cards of the beta examination; hence it was necessary to select the Virginia group, since it could not be obtained from another camp, from companies that were obviously made up entirely of Virginian men. Only a small part of the files was arranged by companies; hence the total sample is too small.

Group II: White draft, additional, by States.—It was intended at the time the plan for analysis was made to make a comparison of States with respect to intelligence. Examination of the figures of table 1 shows that the samples for separate States in Group I would be in many cases inadequate as a basis for comparison. It may be assumed that New York State would be fairly sampled by 4,511 cards or that California might be represented by its 1,233 cards, but it would obviously be unfair to conclude to statements of the intelligence of the Maine draft on the basis of only 376 cards or of the Wyoming draft on the basis of 87 cards. The intention in Group II was, therefore, to select sufficient additional cards for every State so that the total number of cards in Groups I and II for that State should not be less than 1,000. Table 2 gives an analysis of Group II, and the last column of table 1 gives the totals for Groups I and II together. From this column it will be seen that cards proved not to be available in sufficient numbers for Arizona, Colorado, Delaware, Florida, Nevada, New Mexico, Utah, Virginia, and Wyoming.

TABLE 2.—*Group II: White draft, additional by States.*

Numbers of cases in Group II of the principal sample. Additional selections intended to bring the pro-rata samples of less than 1,000 in the small States of Group I up to a minimum of 1,000 for each State. This total of Groups I and II is shown in the last column of table 1. It was not always possible to obtain 1,000 cases, however.

State.	Examination taken.				Camp at which examined.	Total Group II.
	Alpha only.	Alpha-beta only.	Beta only.	All individuals.		
Alabama	262	26	179	9	Pike	476
Arizona	0	0	0	0		0
Arkansas	273	33	90	18	Pike	414
Colorado	298	11	34	7	Travis, 338; scattered, 12	350
Connecticut	344	19	56	27	Devens	446
Delaware	47	1	9	2	Meade, 32; Wadsworth, 22; scattered, 5	59
Florida	0	0	0	0		0
Georgia	193	17	60	4	Gordon	274
Idaho	616	157	44	3	Lewis	820
Kansas	118	3	19	1	Funston	141
Louisiana	341	31	146	7	Pike	525
Maine	413	77	102	31	Devens	623
Maryland	270	3	194	0	Meade	467
Mississippi	415	47	107	31	Pike	600
Montana	496	1	282	0	Dodge	779
Nebraska	268	1	113	0	do	382
Nevada	46	17	3	1	Lewis	67
New Hampshire	561	83	115	35	Devens	794
New Mexico	131	22	201	60	Travis	414
North Carolina	136	22	44	42	Wadsworth	244
North Dakota	523	20	145	0	Custer	688
Oklahoma	160	35	21	10	Travis	226
Oregon	459	88	76	4	Lewis	627
Rhode Island	490	45	161	45	Upton, 563; Devens, 178	741
South Carolina	379	26	214	29	Wadsworth	648
South Dakota	524	0	170	0	Funston	694
Tennessee	90	4	38	1	Gordon	133
Utah	468	140	52	14	Lewis	674
Vermont	638	58	100	26	Devens	822
Virginia	139	0	148	10	Lee	297
Washington	278	45	56	5	Lewis	384
West Virginia	153	3	214	19	Meade	389
Wyoming	384	93	5	4	Lewis	486
Total	9,913	1,128	3,198	445		14,684

Group III: White draft, additional, by camps.—Groups I and II provide a sampling of the white draft of about 56,000 cards. The initial intention in the plan of analysis was to make the sample of the white draft approximately 100,000. It is plain that it would not be possible to have drawn a larger sample, pro-rating by geographical distribution, for certain States have already fallen short of the desired quota. Group III is an additional group, chosen without respect to State, principally for the sake of obtaining larger numbers. It brings the total for the white draft not far short of 100,000 (96,354). Subsequent investigation has shown that the distribution of scores in Group III is not very different from the distribution in Group I. Accordingly it appears a posteriori that Groups I, II, and III do actually constitute a fairly representative sample of the white draft and one that has the advantage of including a large number of cases. In order to make Group III as representative as possible, the group was selected by approximately equal increments from the 15 camps listed in the description of

Group I. These increments were intended to approximate 2,500 each. The counting was done roughly, and in some cases considerably more than 2,500 cards were pulled. An analysis of the group is shown in table 3.

TABLE 3.—*Group III: White draft, additional, by camps.*

Numbers of cases in Group III of principal sample. Additional selections, approximately 2,500 from each of the main camps used for white draft, intended to increase the size of the total sample. States are for the most part not known.

Camp.	Examination taken.				Total Group III.
	Alpha only.	Alpha-beta only.	Beta only.	All individuals.	
Custer	1,985	84	512	91	2,672
Devens	1,999	202	552	151	2,904
Dix	1,720	20	699	93	2,532
Dodge	1,687	1	718	99	2,505
Funston	2,088	13	409	12	2,522
Gordon	1,811	0	615	135	2,561
Grant	1,749	63	745	62	2,619
Lee	1,883	0	569	77	2,529
Lewis	2,035	147	562	88	2,832
Meade	1,430	14	985	93	2,522
Pike	1,968	210	640	136	2,954
Taylor	2,119	0	321	45	2,485
Travis	2,100	278	555	171	3,104
Upton	1,835	243	811	108	2,997
Wadsworth	1,786	78	531	259	2,654
Total	28,195	1,353	9,224	1,620	40,392

It seemed best to keep data upon negro recruits entirely separate from data upon white recruits throughout this report. This procedure is partly a matter of convenience, since the separation of the men in the Army most usually is reflected by a separation of the records in the files, but the striking differences in intelligence ratings that occur between negro and white groups also indicates that a combination of the two types would simply serve to obscure the fundamental and vital differences.

Group IV: Negro draft, pro-rated, by States.—This group represents the negro draft at large. It is comparable to Group I for whites and was selected in the same manner. It seemed desirable to have a total group of approximately 20,000; hence the pro-rating was made on the basis of 1 negro recruit to every 250 negro males, according to the Census of 1910. Table 4 gives the analysis. It will be noted that there are shortages in the cases of Alabama and Mississippi. There were not sufficient cards marked with the State for these two groups. Group IV appears overdrawn in a number of cases. These surplus cases are due to an error by which extra cards reserved for emergencies were by accident included with the main group. The error was not discovered until after the Hollerith sortings had been made.

TABLE 4.—*Group IV: Negro draft, pro-rated, by States.*

Numbers of cases in Group IV of the principal sample. Figures show for every State numbers taking each examination, the actual total number selected for the State, and the desired total on a pro-rata basis of 1 per 250 negro male population in 1910.

State.	Examination taken.				Camp at which examined.	Total Group IV.	Pro rata 1:250 negro males.
	Alpha only.	Alpha-beta only.	Beta only.	All individuals.			
Alabama	271	9	1,052	27	Taylor, 1,222; Custer, 85; Pike, 20; scattered, 32.	1,359	1,791
Arizona	3	1	3	0		7	4
Arkansas	192	11	625	70	Pike	898	893
California	31	7	18	3	Lewis	59	45
Colorado	18	4	6	2	do	30	23
Connecticut	17	8	16	4	Devens	45	29
Delaware	40	10	29	5	Upton	84	64
District of Columbia	30	8	151	21	Meade	210	170
Florida	499	0	122	0	Dix	621	645
Georgia	416	101	1,868	0	Gordon	2,385	2,321
Idaho	4	4	2	2	Lewis	12	2
Illinois	137	11	97	6	Grant	251	228
Indiana	74	0	51	0	Dodge	125	124
Iowa	23	2	11	0	do	36	32
Kansas	87	2	28	0	Funston	117	112

TABLE 4.—*Group IV: Negro draft, pro-rated, by States*—Continued.

State.	Examination taken.				Camp at which examined.	Total Group IV.	Pro rata 1:250 negro males.
	Alpha only.	Alpha-beta only.	Beta only.	All individuals.			
Kentucky	191	0	322	19	Taylor	532	526
Louisiana	538	137	996	14	Grant, 880; Funston, 805	1,685	1,415
Maine	0	0	0	0		0	3
Maryland	146	37	299	43	Meade	525	459
Massachusetts	54	6	27	6	Devens	93	75
Michigan	17	3	22	0	Custer	42	36
Minnesota	9	0	11	0	Dodge	20	17
Mississippi	773	8	959	0	Funston	1,740	2,011
Missouri	196	29	153	0	....do	378	322
Montana	2	0	2	0		4	4
Nebraska	13	4	9	0	Funston	26	17
Nevada	0	0	3	0		3	1
New Hampshire	0	0	0	1		1	1
New Jersey	105	2	70	0	Dix	177	174
New Mexico	3	0	1	0		4	4
New York	197	26	71	10	Upton	304	256
North Carolina	211	1	1,118	49	Dix	1,379	1,358
North Dakota	2	0	1	0		3	2
Ohio	163	11	76	1	Custer, 137; Taylor, 56; Sherman, 25; scattered, 33.	251	232
Oklahoma	93	11	200	0	Dodge	309	288
Oregon	3	1	2	0	Lewis	6	4
Pennsylvania	183	20	216	0	Custer	419	383
Rhode Island	9	0	5	4	Scattered	18	18
South Carolina	334	0	1,303	0	Wadsworth	1,637	1,632
South Dakota	1	0	1	14	Funston	16	2
Tennessee	504	2	417	14	Taylor, 574; Dodge, 363	937	935
Texas	786	376	672	0	Travis	1,834	1,380
Utah	4	3	2	0	Lewis	9	3
Vermont	0	0	0	0		0	5
Virginia	56	0	1,147	1	Meade	1,204	1,322
Washington	7	1	8	0	Lewis	16	15
West Virginia	67	10	91	0	Custer	168	146
Wisconsin	2	0	5	0		7	6
Wyoming	4	0	2	0		6	6
Total	6,520	866	12,290	316		19,992	19,633

Group V: Negro draft, additional, for Northern States.—Reports on the camps have indicated a very great difference in the records of Northern and Southern negroes. Accordingly it seemed desirable to provide for a comparison between negroes from the North and from the South. A typical group for the South can readily be made up by the selection of certain Southern States from Group IV. A number of Hollerith tables intended to represent the South were prepared, using the negro recruits from Alabama, Georgia, Louisiana, and Mississippi. The number of negroes from Northern States in Group IV is, however, too small to provide a sufficiently large sample. Group V was chosen to represent the negro of the North, and selections were made from the typically Northern States in which the negro population is great, namely, Illinois, Indiana, New Jersey, New York, Ohio, and Pennsylvania. In the absence of a better principle it seemed desirable to choose negro recruits on a pro-rata basis from these States, and the ratio of 1 recruit for 50 negro males was chosen. Due to the absence of records of individual examinations from Camp Sherman it was not possible, however, to find records for negroes from Ohio, and for Indiana and Pennsylvania the numbers also fell short. For this reason extra cards were included in the samples from New York, New Jersey, and Illinois. Table 5 gives an analysis of Group V.

TABLE 5.—*Group V: Negro draft, additional, for Northern States.*

Numbers of cases in Group V of principal sample. Additional selections, intended to be on a pro-rata basis of 1 per 50 negro male population in 1910, to give an adequate sample of negroes from the Northern States. The States chosen are listed below, but there proved to be no available cases for Ohio.

State.	Examination taken.				Camp at which examined.	Total Group IV.	Pro-rata 1:50 negro males.
	Alpha only.	Alpha-beta only.	Beta only.	All individuals.			
Illinois	666	88	510	51	Grant	1,315	1,138
Indiana	195	0	64	0	Taylor, 245; scattered, 14	259	621
New Jersey	643	22	325	11	Dix, 783; Upton, 218	1,001	872
New York	991	141	354	45	Upton, 1,204; Dix, 327	1,531	1,281
Ohio	0	0	0	0		0	1,160
Pennsylvania	607	109	578	0	Custer, 1,263; Dix, 38; Upton, 23	1,294	1,917
Total	3,102	360	1,831	107		5,400	6,989

Group VI: White officers.—It was the original intention in selecting officers for Group VI to take them in numbers proportional to their occurrence in each arm of the service in a typical divisional organization. The numbers of officers were noted from Tables of Organization for August, 1918, and selections were made to approximate these numbers for infantry, field artillery, engineers, field signal battalions, machine-gun battalions, and the Medical Department. These proportional figures give, however, groups that are too small in the case of the field signal battalions and the machine-gun battalions. Accordingly the field signal battalion group was made as large as possible (390), and the machine-gun battalion group was increased to 500. The Medical Department was subsequently enlarged because of the availability of records from this department, and in order that sortings might be made separately for Medical Corps, Dental Corps, Veterinary Corps, and Sanitary Corps. A group from the Quartermaster Corps was added, and a small group of chaplains and members of the school for chaplains was appended still later. An analysis of Group VI is given in table 6.

TABLE 6.—*Group VI: White officers.*

Number of cases in Group VI of principal sample. Figures show number of cases (all examination alpha), code number for military organization (v. Hollerith code), and camp at which examinations were made.

Camp at which examined.	Military organization.								
	Infantry.	Field artillery.	Engineers.	Field signal battalions.	Machine-gun battalions.	Medical Depatrment.[1]	Quartermaster corps.	Chaplains and school for chaplains.	Total.
Code number	01	02	05	06	03	09–12	08	14	.....
Bowie	.....	.....	.....	28	.....	.....	.....	.....	28
Cody	279	.....	45	11	64	.....	.....	.....	399
Devens	500	.....	55	21	16	258	52	15	917
Dodge	713	.....	.....	17	57	236	47	.....	1,070
Fremont	.....	.....	.....	.....	.....	.....	45	.....	45
Grant	300	.....	.....	.....	.....	321	50	.....	671
Greenleaf	.....	.....	.....	.....	.....	1,017	.....	.....	1,017
Hancock	.....	.....	.....	.....	76	.....	.....	.....	76
Humphreys	.....	.....	728	.....	.....	.....	.....	.....	728
Jackson	.....	530	.....	19	.....	76	96	.....	721
Kearney	.....	.....	.....	.....	10	18	5	.....	33
Lee	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lewis	970	396	60	25	36	345	62	23	1,917
Logan	.....	.....	.....	.....	.....	64	21	.....	85
Meade	150	.....	.....	163	.....	.....	.....	.....	313
Pike	1,184	167	70	15	66	341	44	.....	1,887
Sevier	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sheridan	410	196	.....	32	31	199	109	13	990
Sherman	850	50	.....	.....	22	326	50	13	1,311
Taylor	.....	.....	.....	.....	.....	.....	.....	261	261
Travis	435	170	59	34	38	.....	.....	.....	736
Upton	.....	.....	.....	.....	1	207	15	.....	223
Wadsworth	1,256	61	.....	25	83	337	100	.....	1,862
Wheeler	.....	.....	.....	.....	.....	175	63	.....	238
Total	7,047	1,570	1,017	390	500	3,920	759	325	15,528

[1] The numbers in the Medical Department are made up as follows:

Medical Corps	3,273
Dental Corps	441
Veterinary Corps	103
Sanitary Corps	103
Total	3,920

It was originally intended to select officers of the different arms of service equally from different camps in order that the differences in camp procedure might not produce fictitious differences between groups of officers. This procedure proved impossible, because of the small numbers of records available in many cases. Records had to be used wherever they could be found. Since all these records are based upon examination alpha it is probable that the camp procedure makes ultimately little difference; the greatest differences between camps occurred with beta and individual examinations.

Table 6 gives the counts for the various groups as made initially by hand. There are slight discrepancies with the results of the Hollerith sortings, which sometimes exceed and sometimes fall short of the totals of table 6. The officer groups were, however, not sorted by

camps on the Hollerith machines and no other such data are therefore available. The discrepancies are small and the columns of the table serve thus to give an approximate knowledge of the constitution of each group.

It was initially planned to select a group of negro officers (Group VII). This group was omitted because it was found that there were only a few hundred cards available.

Group VIII: White established organizations.—This group was selected to provide comparison between various arms of the service. In it records of men in the various military organizations of divisions and camps were taken in large enough numbers to permit of intercomparison. According to an original plan it was intended to select at least a thousand cards for every group and to take this thousand in four packs of 250 from each of the same four camps where a division had been in training. This plan proved, however, largely impracticable. In some cases not so large groups could be found, and in most cases it was necessary to go to different camps for different arms and to more than four camps. An attempt was made, however, to keep a certain amount of balance by offsetting a selection from a camp in which the scores were known to run high by an additional selection from a camp where the men were inferior. The ultimate inclusion of additional camps made it possible to increase the size of the main infantry group (rifle companies) and the main artillery group (batteries)—the two organizations a comparison of which is especially interesting. Two thousand cards were pulled for each of these groups.

Table 7 gives the analysis of Group VIII. The separation is in accordance with divisional Tables of Organization: Infantry into rifle companies, machine-gun companies, supply companies, and headquarters companies; field artillery into batteries, trench mortar batteries, supply companies, and headquarters companies; the letter companies of the engineers, the field signal battalions, and the machine-gun battalions; the trains into divisional military police, ammunition trains, supply trains, the ambulance companies of the sanitary train, and the field hospitals of the sanitary train; and the medical organizations into the medical detachments to be found with line organizations. In addition to these organizations were added base hospitals trained for overseas, base hospitals organized in camps in the United States, nurses, an officers training camp group of 2,000, and a development battalion group of 2,000.

TABLE 7.—*Group VIII: White established organizations.*

Number of cases in Group VIII of principal sample. Table shows various organizations sampled, corresponding code numbers (v. Hollerith code), and, in the last row, the total size of the samples. The number of cases stated for the camps separately is approximate, not exact, since final sortings were not made by camps. They show, however, the approximate constitution of the sample.

Camp at which examined.	Military organization.										
	Infantry.				Field Artillery.				Divisional organizations.		
	Rifle companies.	Machine-gun companies.	Supply companies.	Headquarters companies.	Batteries.	Trench mortar batteries.	Supply companies.	Headquarters companies.	Engineers, letter companies.	Field Signal battalions, letter companies.	Machine-gun battalions, letter companies.
Code number	41	61	51	31	42	62	52	32	65	66	63
Bowie	250			13	250	113	266	230			
Cody	250	239	250	250	250	59	250	250	250	250	250
Custer											
Devens											
Fremont											
Grant											
Jackson					250						
Kearny	250			58	250	8	196	250	52		
Lee	250	223	117	144	250				120		250
Lewis	250			23	146					90	62
Logan											
MacArthur											
McClellan					250	205	250	250			
Meade										250	
Pike											
Sevier	250	170		11					184	126	33
Sheridan	250	250	250	250	64				250	236	250
Sherman			250								
Travis	250	250	218	250	250	38	114	150	122	48	28
Upton					64						
Wadsworth									12		127
Total	2,000	1,161	1,085	1,000	2,000	426	1,026	1,130	990	1,000	1,000

TABLE 7.—*Group VIII. White established organizations.*

Camps at which examined.	Military organizations											
	Trains					Medical detachments				Development battalions.	Officers' training camps.	Total.
	Military police.	Ammunition trains.	Supply trains.	Sanitary train, ambulance companies.	Sanitary train, field hospitals.	Medical detachments in base sections.	Nurses.	Base hospitals, overseas.	Base hospitals, United States camps.			
Cases number	15	16	17	19	29	66	26	40	46	22	29	.....
Bowie	.....	.....	.....	.....	.....	93	.....	200	.....	.....	.....	1,380
Custer	250	250	250	250	250	122	.....	50	250	.....	.....	1,[illegible]
Dodge	.....	.....	.....	.....	.....	.....	.....	.....	250	.....	.....	250
Dix	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fremont	.....	.....	.....	.....	.....	.....	120	.....	.....	.....	.....	120
Grant	.....	.....	.....	.....	.....	.....	.....	.....	250	.....	500	750
Jackson	.....	.....	.....	.....	.....	.....	.....	174	.....	.....	.....	174
Kearny	.....	.....	.....	24	5	250	.....	250	.....	500	.....	2,129
Lee	60	120	250	250	125	52	121	250	250	500	500	3,028
Lewis	.....	21	.....	124	92	52	.....	.....	.....	500	.....	1,[illegible]
Logan	.....	.....	.....	.....	.....	.....	104	.....	.....	.....	.....	104
MacArthur	.....	.....	.....	.....	.....	.....	.....	180	.....	.....	500	680
McClellan	.....	200	.....	.....	.....	42	.....	.....	.....	.....	.....	1,[illegible]
Meade	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	200
Pike	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	500	500
Sevier	53	.....	135	35	12	64	.....	.....	.....	.....	.....	1,[illegible]
Sherman	205	.....	250	250	150	150	.....	100	.....	500	.....	3,[illegible]
Sherman	.....	.....	.....	.....	.....	.....	40	.....	.....	.....	.....	280
Travis	97	.....	.....	.....	.....	152	.....	35	.....	.....	.....	1,942
Upton	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	40
Wadsworth	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	139
Total	906	944	885	[illegible]	877	1,[illegible]	421	1,384	1,[illegible]	2,[illegible]	1,[illegible]	24,455

In order that no group should be too much affected by local conditions of examining, it was made a rule that not over 250 cards should be taken in any one group from any one camp. The only exception to this rule is in the case of development battalions and the officers' training camps, where single batches of 500 cards were taken together. Under this rule it was not possible always to obtain a sample so large as a thousand. All the groups for the trains fall more or less short of a thousand (606 to 904). Only 421 nurses were found among the files, and the trench mortar batteries furnished only 426 cases.

It should be noted that the figures of table 7, like those of table 6, are the counts made by hand. In a number of instances the sortings from the Hollerith program disagree. These discrepancies are ordinarily due to errors of counting. In the case of the engineers they are due to a subsequent elimination of men in the engineers train which were included in the original counts. A large discrepancy in the case of the supply trains is similarly due to an elimination during the Hollerith sorting of certain Quartermaster Corps men who did not properly belong to the supply train. The figures of table 7 are intended merely to show the extent to which each group is dependent upon the particular conditions obtaining in separate camps.

Group VIII, in addition to the comparison of military organizations, provides the only data available in the principal sample for the comparative ratings of noncommissioned officers and privates, since no noncommissioned officers were included among the recruits of Groups I to III. It also gives an opportunity for a comparison of established organizations with the draft. Presumably the building up of an organization exercises certain selective factors which should be reflected in the intelligence ratings of the organization when established.

A group of negro established organizations (Group IX), originally contemplated, was abandoned because of the lack of record cards.

Group X: Special experimental group.—For the sake of special statistical work a group of 1,047 white, English-speaking recruits was brought together from nine camps. This group was obtained by a request sent to the camps in June, 1918, asking that unselected groups of the white draft be given both examination alpha and examination beta, and, when possible, the Stanford-Binet examination. The request was sent to 12 camps, and response was received from the 9 listed in table 8. The records returned from the camps were gone over, and all cards of men not born in English-speaking countries were eliminated. It was thought that

this procedure rendered the adequacy of the beta examination unquestionable, since it was not certain at that time that foreign-born men were not under a certain handicap even in beta because of language deficiencies. Table 8 summarizes Group X.

TABLE 8.—*Group X. Special experimental group.*

Number of cases in Group X, 1,047 English-speaking, but otherwise unselected, men from the white draft, who took both alpha and beta examinations for correlational purposes; 653 of these men also took the Stanford-Binet examination. Table shows the distribution by camps.

Taking alpha, beta, and Stanford-Binet examinations:		
Camp Custer	64	
Camp Dix	93	
Camp Jackson	102	
Camp Lee	105	
Camp Meade	91	
Camp Pike	67	
Camp Upton	54	
Camp Wadsworth	41	
Camp Wheeler	36	
Total		653
Taking alpha and beta examinations:		
Camp Custer	15	
Camp Greenleaf	233	
Camp Pike	36	
Camp Taylor	65	
Camp Upton	17	
Camp Wheeler	28	
Total		394
Total Group X		1,047

This group is a very important group, because upon it most of the analysis of tests and the statistical treatment for the combination of different types of examination has been based. It forms the foundation of the immediately subsequent chapters of this part (q. v.).[1]

Summary.—Table 9 gives a summary of all groups. It will be noted that there is available altogether a sample of 96,354 records of white recruits, a sample which is fairly representative of the country, for Groups I, II, and III give approximately the same form of distribution. The total of records for negro recruits is 25,392, of which 5,400 are for northern negroes only. The sample for white officers is 15,528, and for white established organizations 24,205. The approximate total of the principal sample is 162,526.

TABLE 9.—*Summary of principal sampling.*

Number of cases in various groups of principal sample: cf. tables 1 to 8.

Group No.	Designation.	Number of cases.
I	White draft, pro-rated by states	41,278
II	White draft, additional, by states	14,684
III	White draft, additional, by camps	40,392
	Total white draft	96,354
IV	Negro draft, pro-rated, by states	19,992
V	Negro draft, additional for northern states	5,400
	Total negro draft	25,392
VI	White officers	15,528
VIII	White established organizations	24,205
X	Special experimental group	1,047
	Grand total	162,526

[1] See also the use of this group and its description in Part II, chapter 7, pages 379 to 395.

SECTION 3.—*Hollerith analysis.*

Statistical analysis of the principal sample was planned for the Hollerith system of mechanical sorting. In this system it is necessary that the information to be dealt with be coded in numerical terms and then punched into Hollerith record cards. It was decided to code the following items (see reproduction of Hollerith record card, p. 568): Statistical group number for the principal sample as mentioned above (section 2), camp at which the examination was made, State from which the man was drafted, age, rank, arm of service or whether a recruit, country of nativity in the case of foreign-born men, number of years that foreign-born men have been in the United States, number of years schooling reported, the form of alpha examination, the score on each of the separate tests of the alpha or beta examination (but in the case of men taking both examinations only the score for alpha, since the record card is not large enough to include both sets), total raw score in the alpha examination, total raw score of the first seven tests in the beta examination, the form of the individual examination (i. e., whether performance scale, point scale, or Stanford-Binet scale), the score in individual examination, and finally an index (used later in the statistical combination of results) of the particular combination of examinations taken by the man (whether alpha alone, or alpha with beta, or beta with an individual, etc.). It should be noted that this arrangement makes available considerable information on the separate tests, information which it has, however, not been possible to utilize very fully. The object of giving the alpha scores in the separate tests in preference to the beta scores when both are available was to provide a complete distribution of performances in alpha. The beta group is already highly selected at the upper end by the segregational procedure for dividing between alpha and beta; hence, further distortion due to the elimination of cases at the lower end is not a matter for concern. The total scores for alpha and beta are both given when both examinations were taken.

The examination scores were coded so as to give the following class intervals: For alpha, 5 points; for beta, 5 points; for performance scale, 5 points (an interval, however, which proved too small and which has therefore been doubled—10 points—in the tables); Stanford-Binet scale, one-half year.

The principal statistical difficulty encountered in the comparison of these psychological records is the one that occurs when it is desired to compare two groups, each of which contains various numbers of records based on the different types of examination. Some theory of combination must be adopted. Alpha, beta, and individual examination need to be expressed in some common system of measurements in order that the comparisons may be simple and brought readily within the range of attention. The difficulties of such a combination and the mathematical development of a scheme are set forth in chapter 2. The scheme of this chapter should have been developed prior to the making of the plan of analysis. It would have been highly desirable, for example, if a rating in terms of an ideal common scale could have been placed upon each record selected and coded on the Hollerith card. Unfortunately, however, a shortage of statistical aid not only delayed the completion of this study until after the initiation of the mechanical analysis, but even until after the completion of most of the other studies of this part, which should logically have been based upon the ideal scheme of combination. Failing a common set of terms for the various examinations, it was decided to code the principal sample and to make the Hollerith sortings in such manner that there would be separate tables for each type of examination and also for the cases where one type of examination overlapped another type. The various items given below in the code for "combination of examinations" provide for sortings with respect to these various divisions.

Rules for coding.—The rules for coding are given herewith in part because they explain in detail the general statements made just above and in part because in the event that these records, now in the Surgeon General's Office, should be used for subsequent research they make plain the details of the information available on the Hollerith cards.

Group number was not coded on the psychological record card[1] but was marked on each package of cards. It was punched, however, on each Hollerith card.

Personal information was coded in red ink along the left-hand margin of the upper part of the card in the following order: Camp, State, age, rank, arm, nativity, years in United States, schooling. An omitted item was indicated by "X" or "XX."

The column of raw scores in the separate tests to be punched on the Hollerith card was checked. Raw scores were always used, even when weighted scores were given, in order to place all data upon the same basis. When test 1 of beta was given with weighted score it was an indication that the raw score had been assigned on the basis of a perfect score of 10 points. Half the recorded value was in such cases written in so that test 1 might be scored in a manner of the later rule. Test 8 in beta was never recorded, in order that the data might be comparable with the latest procedure for giving beta. When a score for it did occur it was marked with an "X."

The code numbers for type of individual examination, total score in individual examination, and combination of examination were entered successively at the lower right-hand corner of the card under "Mechanical Test."

When any item was missing, illegible, doubtful, or obviously incorrect, and could not therefore be coded, an "X" (or, for a two-digit number, "XX") was placed on the card in the position in which the code number should have stood.

HOLLERITH CODE.

1. Group:

1. White draft, pro-rated, by States.
2. White draft, additional, by States.
3. White draft, additional, by camps.
4. Negro draft, pro-rated, by States.
5. Negro draft, additional, for Northern States.
6. White officers.
7. White established organizations.

2, 3. Camp:

01. Beauregard.
02. Bowie.
03. Cody.
04. Custer.
05. Devens.
06. Dix.
07. Dodge.
08. Fremont.
09. Funston.
10. Gordon.
11. Grant.
12. Greene.
13. Greenleaf.
14. Hancock.
15. Jackson.
16. Kearney.
17. Lee.
18. Lewis.
19. Logan.
20. MacArthur.
21. McClellan.
22. Meade.
23. Pike.
24. Sevier.
25. Shelby.
26. Sheridan.
27. Sherman.
28. Taylor.
29. Travis.
30. Upton.
31. Wadsworth.
32. Wheeler.
33. Humphreys.

4, 5. State from which drafted (S. G. O. code):

XX. State not given.
01. Alabama.
02. Alaska.
03. Arizona.
04. Arkansas.
05. California.
06. Colorado.
07. Connecticut.
08. Delaware.
09. District of Columbia.
10. Florida.
11. Georgia.
12. Idaho.
13. Illinois.
14. Indiana.
15. Iowa.
16. Kansas.
17. Kentucky.
18. Louisiana.
19. Maine.
20. Maryland.
21. Massachusetts.
22. Michigan.
23. Minnesota.
24. Mississippi.
25. Missouri.
26. Montana.
27. Nebraska.
28. Nevada.
29. New Hampshire.
30. New Jersey.
31. New Mexico.
32. New York.
33. North Carolina.
34. North Dakota.
35. Ohio.
36. Oklahoma.
37. Oregon.
38. Pennsylvania.
39. Rhode Island.
40. South Carolina.
41. South Dakota.
42. Tennessee.
43. Texas.
44. Utah.
45. Vermont.
46. Virginia.
47. Washington.
48. West Virginia.
49. Wisconsin.
50. Wyoming.
51. Panama.
52. Porto Rico.
53. Philippines.
54. Hawaii.
55. Other.

[1] Cf. Part I, p. [illegible].

6. Age:

0. 20 and less.
1. 21–22.
2. 23–24.
3. 25–26.
4. 27–28.
5. 29–30.
6. 31–40.
7. 41–50.
8. 51–60.
9. 61 and more.

7. Rank:

0. Miscellaneous.
1. Recruit.
2. Private, private first class.
3. Corporal.
4. Sergeant, sergeant first class, sergeant major.
5. Second lieutenant.
6. First lieutenant.
7. Captain.
8. Major.
9. Higher than major.

8, 9. Military organization:

01. Infantry (general).
31. Infantry, headquarters companies.
41. Infantry, rifle (lettered) companies.
51. Infantry, supply companies.
61. Infantry, machine-gun companies.

02. Artillery (general).
32. Artillery, headquarters companies.
42. Artillery, batteries (lettered).
52. Artillery, supply companies.
62. Artillery, trench mortar batteries.
16. Artillery, ammunition trains.

03. Machine-gun battalions.

05. Engineers.

06. Field Signal Corps.

08. Quartermaster (officers).
17. Supply trains (enlisted men; cf. 08).

09. Medical (M. C. officers and divisional M. D. enlisted men not in sanitary train or base hospitals; cf. 19, 20, 39, 40).
10. Dental Corps.
11. Veterinary Corps.
12. Sanitary Corps.
19. Ambulance companies, sanitary train (enlisted men; cf. 09).
20. Field hospitals, sanitary train (enlisted men; cf. 09).
26. Nurses.
39. Camp base hospitals (enlisted men, U. S.; cf. 09, 19, 20, 40).
40. Overseas base hospitals (enlisted men, A. E. F.; cf. 09, 19, 20, 39).

14. Chaplains and school for chaplains.
23. Officers' training camp.

15. Military police (divisional headquarters train).
16. Artillery, ammunition trains.
17. Supply trains (enlisted men; cf. 08).
19. Ambulance companies, sanitary train (enlisted men; cf. 09).
20. Field hospitals, sanitary train (enlisted men; cf. 09).

21. Depot brigade; recruits.
22. Development battalions.

10, 11. Nativity (S. G. O. code):

00. United States.
60. Armenia.
61. Austria.
62. Belgium.
93. Bohemia.
63. Bulgaria.
64. Canada.
65. Central America.
66. China.
67. Cuba.
68. Denmark.
69. Egypt.
70. England.
71. Finland.
72. France.
73. Germany.
74. Greece.
75. Holland.
96. Hungary.
76. India, East.
77. India, West.
78. Ireland.
79. Italy.
80. Japan.
81. Mexico.
82. Norway.
83. Poland.
84. Roumania.
85. Russia.
86. Scotland.
87. Serbia.
88. South Africa.
89. South America.
90. Spain.
91. Sweden.
92. Switzerland.
94. Turkey.
95. Others.

12. Years of foreign-born in United States:

0. Less than 1 year.
1. 1 year.
2. 2 years.
3. 3 years.
4. 4 years.
5. 5 years.
6. 6–10 years.
7. 11–15 years.
8. 16–20 years.
9. Over 20 years.

13 14. Schooling:

00. No schooling.
01. 1 grade.
02. 2 grades.
03. 3 grades.
04. 4 grades.
05. 5 grades.
06. 6 grades.
07. 7 grades.
08. 8 grades.
09. 9 grades; 1 year in high school.
10. 10 grades; 2 years in high school.
11. 11 grades; 3 years in high school.
12. 12 grades; 4 years in high school.
13. 1 year in college.
14. 2 years in college.
15. 3 years in college.
16. 4 years in college.

Add a unit for additional graduate years in college.

15. Alpha form number (no coding):
   5. Form 5.
   6. Form 6.
   7. Form 7.
   8. Form 8.
   9. Form 9.

16–31. Raw scores for separate tests:
   Actual scores (no coding).
   Check the column to be punched.
   When both alpha and beta are on the same card, check alpha.
   When beta is checked, place an "X" in the raw score space for test 8.
   When beta is weighted and checked, write in for test 1 one-half the raw score indicated.

32, 33. Total raw alpha score (8 tests):
   Divide the score by 5 and drop the remainder. Precede a one-digit number by a "0."

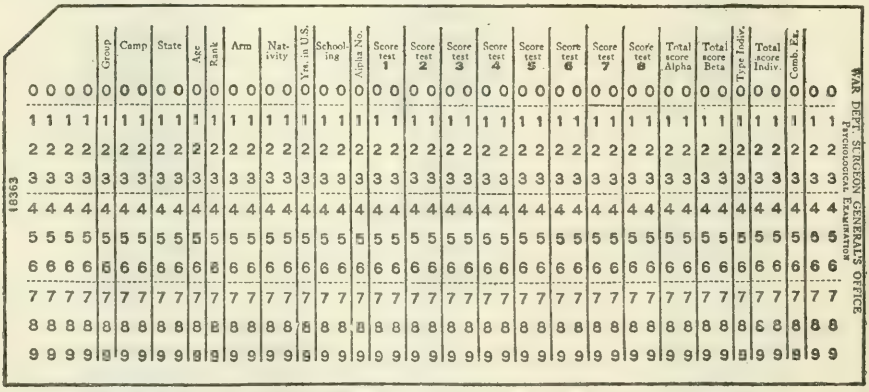
34, 35. Total raw beta score (7 tests):
   Divide the score by 5 and drop the remainder. Precede a one-digit number by a "0."

36. Type of individual examination:
   1. Performance scale.
   2. Point scale.
   3. Stanford-Binet scale.

37, 38. Total score in individual examination:
   Performance—Divide the number of points by 5 and drop the remainder.
   Point scale—Divide the number of points by 5 and drop the remainder.
   Stanford-Binet scale—Double the mental age (expressed with one decimal) and drop the decimal. Always precede a one-digit number by a "0."

39. Combination of examination:
   1. Alpha only.
   2. Beta only.
   3. Individual only.
   4. Alpha and beta.
   5. Alpha and individual.
   6. Beta and individual.
   7. Alpha, beta, and individual.

The Hollerith card for mechanical sorting is reproduced, slightly diminished in size, herewith in a figure. The information coded on the psychological record cards was transferred to code slips on which the numbers were recorded regularly, one below another; the numbers on the code slips were checked and then punched on the Hollerith card. (The procedure is that of punching a hole through the proper number in each column. When an item is coded by a two-digit number, then the ten's place is punched in the first column and the unit's in the second.) The punching was also checked.



Statistical record card used in mechanical sorting by Hollerith system. All information is coded in numerical values and holes punched in the corresponding numbers on the card. A two-digit number is represented by two holes in adjacent columns. The figure is reduced from 7⅜ inches long.

The entire work of coding and sorting was delayed by the lack of adequate clerical and statistical facilities. For coding, six clerks were available for a period of two months. In this time they coded approximately 160,000 cards, which make up the principal sample. No

time was available for checking the entire group. Samples of every clerk's work were taken at various times; errors were indicated on less than 1 per cent of the cards. Some of these errors were found later when the records were transferred to code slips. If an adequate force of 50 clerks could have been available for two weeks all records could have been done promptly and checked and work of the analysis could have proceeded without the numerous delays that occurred subsequently.

The transfer of the information to code slips, the punching of cards, the mechanical sorting, and the tabulation of the records was accomplished by the assistance of the Actuary of the Bureau of War Risk Insurance. At one time over 100 clerks were employed on the work. Had it not been for gratuitous assistance from outside the War Department it would not be possible to put forth the present tables.

Sorting.—It would have been desirable to prepare Hollerith tables with respect to every pair of relevant variables both for every one of the combinations of examination (see code) separately and for every kind of score. For example, in a comparison of schooling with intelligence it would be desirable to prepare scatter tables of schooling against the alpha scores of men who took alpha only, against the beta scores of men who took beta only, against the alpha scores of men who took alpha and beta together but no individual examination, and against the beta scores of men who took alpha and beta together. When the three types of individual examination are added to such a scheme we find, however, that 28 tables are necessary for every comparison, for we need to have the alpha scores of men who took alpha, beta, and performance, and the beta scores of men who took alpha, beta, and performance, and the performance scores of men who took alpha, beta, and performance, and the alpha scores of men who took alpha, beta, and point scale, and so on. To multiply the number of desired comparisons by 28 is, however, impracticable. Accordingly the number of tables for every comparison had, in the mechanical sorting, to be reduced to seven, as follows:

1. Alpha scores of alpha only.
2. Beta scores of beta only.
3. Alpha scores of alpha-beta only.[1]
4. Beta scores of alpha-beta only.
5. Performance scale scores of all men who took the performance scale whether with alpha or beta or without.
6. Point scale scores of all men who took point scale whether with alpha or beta or without.
7. Stanford-Binet mental ages of all men who took the Stanford-Binet examination whether with alpha or beta or without.

Ideally it would also be desirable to have available in the treatment of these data separate tables for every camp. The results are always a function of camp procedure and frequently it is impossible to tell whether we are dealing with a real difference or with an artifact that grows out of differences between camps which contribute, it may be, unequally to two different samples. In almost no case, however, are less than 15 camps involved, and in many cases the number of camps is over 20. To multiply the desired number of comparisons by 15 is just as impracticable with the available facilities for analysis as it would have been to have increased the comparisons for all the various combinations of examination. Accordingly it has been necessary to be satisfied with sorting various main divisions of the principal sample by camps and to trust that the sampling has so far distributed the camps as to render camp differences ineffective in the particular comparisons.

It may be noted in this connection that an early plan for sorting, in which the minimum number of divisions by combination of examination were made and in which it was planned to sort separately for camps in all the more important sortings, called for the preparation of

[1] We have referred to the alpha examination briefly as "alpha" and to the beta examination as "beta." We shall use the term "alpha-beta" for the combination of examination in which alpha and beta were taken but no individual examination. Similarly, we shall speak of "alpha-beta-individual" when all three examinations were taken. Similarly, the terms "alpha-individual" and "beta-individual" indicate an individual examination with one or the other of the two group examinations.

nearly 2,000 tables. By considerable pruning and in particular by giving up the separation by camps this number was finally reduced to 255 tables. After the sorting had begun it was necessary to reduce the number of tables still further to 180 in order to keep the work within reasonable time. Even with this reduction six Hollerith sorting machines and four Hollerith tabulators were kept busy for the greater part of three weeks in making the sortings.

SECTION 4.—*Presentation of data.*

A word upon the history of the preparation of Part III will make understandable both certain omissions from the part and also some failures of coordination between naturally related chapters. Work upon the main statistical analysis of psychological examining was begun in December, 1918, under the direction of Maj. Yerkes and the immediate supervision of Capt. Boring. Plans for Hollerith analysis and the tentative lists of sortings referred to above were made out and finally approved. Considerable difficulty was experienced, however, in obtaining authority for clerical help to undertake the coding.

Finally, after numerous delays, six clerks were secured early in January, 1919, and the work of the selection of cards and of coding progressed. Capt. Boring and an assistant made the selections from the files and counted the cards. Incidentally, at the same time they unpacked the boxes from the camps and put these cards in files. The six clerks continued the coding until March 15, when the coding was completed. During this period occasional samples of the coders' work were checked. It was obviously impossible to check the entire task with such insufficient clerical help; complete checking would have required a month to six weeks longer. The transfer of the coded information from the psychological record cards to code slips was made unexpectedly necessary by the system in use where the Hollerith sorting was done. It had not been foreseen from the first that this sorting could not be done by the statistical division of the Surgeon General's Office, and, when it was found necessary later to accept the courtesy of the Actuary of the Bureau of War Risk Insurance, it proved necessary to have the records in simpler form for the use of his punch operators.

The transfer of all this information to code slips and its entire checking was accomplished by about 150 clerks in 10 days' time. Thereafter the cards went to the punch operators and early in April sorting on the Hollerith machines was begun. For this purpose the Actuary of the Bureau of War Risk Insurance made available six sorting machines and four tabulating machines, together with their operators. An officer of the Section of Psychology was placed in charge. The tables were completed by the beginning of May, after approximately three weeks of sorting.

Had the preparation of Part III been delayed until the completion of these tables no work for the part could have been undertaken until May. Since the discontinuance of both commissioned and clerical personnel was promised for July 1 such a procedure would have been disastrous to the completion of Part III. The difficulty was avoided, though only in a small part, by deciding on the program for Part III and having authors begin their work where possible prior to the completion of the Hollerith sorting.

It was foreseen that a scheme for the combination of examinations alpha and beta in particular and of the individual examinations with alpha and beta would be necessary in any such detailed comparison of groups as this part contemplated. Considerable doubt occurred in the early stages of the work as to the proper mode of combination; for example, the question arose whether regressions of beta and individual examinations upon alpha should be used or regressions upon beta, or whether the examinations should be made equivalent by equating scores corresponding to equal percentile points, or whether some other procedure should be adopted. The fact that the distributions for these examinations are presumably not normal distributions, that correlations between them are not linear, and that in general the examination scales are not made up throughout of equivalent units, cast doubt upon the validity of any very accurate application of the ordinary theory of probabilities and of correlation to these data. Accordingly Mr. Brown and Lieut. May prepared early in February a memorandum presenting a plan of combination of examinations alpha and beta—the plan which is worked

out in chapter 2 of Part III. This plan was adopted with the intention of completing the scheme of analysis before any work upon the Hollerith sortings was undertaken. The cards of Group X were to be used as its statistical basis and the 136 correlation tables between the eight tests of alpha and the seven tests of beta were prepared by officers of the staff of the Section of Psychology during two weeks in February when they were permitted the use of the Hollerith machines in the Surgeon General's Office during the evening.

Statistical work on the scheme of combination began late in February and it was hoped that it might be completed by the time that the Hollerith sortings were ready for use. The task, however, proved to be very much greater than had been at first supposed and the scheme was not completed until the first few days in June. By this time most of the manuscript for Part III was well under way. It had been necessary to assign June 15 as the final date for all manuscripts. Accordingly it was not possible to use the scheme widely in the other chapters of Part III. The scheme is presented in detail because it is in itself a valuable contribution to statistical method in the treatment of tests, because it furnishes more light on the nature of the separate tests in the group examinations and of their interrelations than could any other treatment, and because it provides the basis for further research should such opportunity arise.

The manuscript for Part II was completed, with the exception of editing, on May 1. At this time, however, the personnel of the Section of Psychology was considerably diminished. Throughout the month of May there were available for work on this report Capt. Boring, Lieut. Lincoln, Lieut. May, and Mr. Brown. Capt. Boring was obliged to give considerable time to the editing of Parts I and II during May. Miss Cobb and Lieut. Mertz gave part time to the report. Since Lieut. May and Mr. Brown were entirely engaged in statistical work, the writing of all the subsequent chapters, with the exception of a few that had been prepared earlier during the winter, devolved upon three psychologists. Clerical help was also diminished on the first of May, so that the authors had very little assistance. Sergt. First Class B. M. Oppenheim, who prepared the original drawings for the figures of Parts II and III, was retained as draftsman until July 1. During the first two weeks of June Lieut. Metcalf was added to the group of authors and Miss Cobb gave full time. This shortage of personnel is responsible for a less thorough treatment of many of the topics than could be desired. The general plan agreed upon to meet the emergency was the printing, with a view to future research, of as much of the original data coming from the Hollerith sortings as possible, and then a more superficial discussion of such principal results as could be arrived at by a simple statistical treatment of the tables.

The reader of the chapters of this part will find, in accordance with this plan, that in general chapters which are based upon data from the Hollerith analysis begin with a set of tables from the principal sample. These tables are followed by such discussion as is feasible and additional tables which are immediately relevant to the discussion. It was planned to print in every such case seven tables of Hollerith sortings which it is presumed will furnish an adequate basis for any form of statistical treatment that may be desired in the future. The seven tables are as follows:

1. Alpha scores of men taking examination alpha only.
2. Beta scores of men taking examination beta only, or examination beta with examination alpha only.
3. Total score of all men taking performance examination, with or without a group examination.
4. Total score of all men taking point scale examination, with or without a group examination.
5. Mental ages of all men taking Stanford-Binet examination, with or without a group examination.
6. Alpha scores of all men who took alpha, with or without beta and with or without an individual examination.
7. Beta scores of all men who took beta, with or without alpha and with or without an individual examination.

The first five tables are reciprocally exclusive; no single case occurs in more than one table. They can be combined on any scheme of regressions that seems desirable, provided the statistician is willing to admit that the beta score of a man recalled from alpha to beta is the preferable measure, and the score in individual examination of a man recalled from either of the group examinations is also preferable to his score in the group examination. The printing of the alpha and beta scores of men taking individual examinations or of the alpha scores of men taking beta is prohibited by lack of space. The sixth and seventh tables do, however, give complete distributions for alpha and beta for any one that is interested in an analysis of these examinations alone; and tables 3, 4, and 5 are similarly complete for each of the individual examinations. In some instances the number of cases falling in some of these seven fundamental tables is so small as to be negligible (for example, performance scores of negroes, who were practically always given Stanford-Binet). In such cases the table is omitted.

The work of the various members of the staff of the Section of Psychology has been so closely interrelated, assistance has been so frequently rendered, and authors have so frequently submitted to compromises or to revisions of their work that it is not possible to assign either credit or responsibility for the chapters of this part with any degree of accuracy. The Hollerith analysis was under the immediate supervision of Capt. Boring, who has also prepared this chapter and exercised with Maj. Yerkes editorial supervision over Part III.

Chapter 2 presents in the main the statistical work of Mr. Brown and Lieut. May, which has already been referred to. The data on forms of alpha were prepared by Miss Cobb. The Section of Psychology is indebted to Prof. Karl Pearson of the University College, London, for considerable statistical work on the regression curves of alpha and beta, which are also presented in these chapters. Unfortunately, these curves were received at a time which rendered their full utilization in the general scheme of treatment difficult.

It is rather important that camps should be compared, one with another, since (cf. tables 6 and 7 and relevant discussion) camp differences may readily be reflected in differences between other groups and lead to erroneous interpretations. This comparison, however, involves the application of the scheme of combination which was completed too late for use. Lieut. Lincoln has made the comparison, however, upon a more superficial basis.

The original selection of Group II was made with the intention of determining intelligence averages for the various States. It was found on a comparison of the returns from different camps, however, that differences between camps were very great indeed. Since a single State was for the most part selected from a single camp, it is practically impossible to isolate differences between States from camp differences. It may be that a detailed study would reveal certain States examined in like camps and therefore comparable. The results are important and, since the pressure of time would render anything but a most inadequate treatment impossible, it has seemed better to omit statistical treatment altogether, rather than to run the risk of factitious conclusions.[1]

The same argument applies to a less extent to differences in nativity of foreign-born recruits. Lieut. Lincoln has, however, found time to deal with this subject briefly. The data on the relation of intelligence ratings to age were brought together by Lieut. Lincoln; those on the relation to physical factors by Dr. Hayes. Miss Cobb has prepared the chapters on literacy, schooling, and the relation to the number of years that foreign-born recruits have been in the United States. Capt. Elliott began the study of the intelligence of the negro, which was completed by Lieut. Metcalf. Lieut. Lincoln has dealt with the problem of the rank of officers, with the officers' training camps, noncommissioned officers' schools, and the Students' Army Training Corps, and in general with disciplinary cases. Maj. Foster prepared the chapter on arms of the service. The chapter on the relation of intelligence rating to occupation was begun by Dr. Bridges and completed by Capt. Paterson. The description of the general intelligence of the draft and its relation to discharge or rejection from the Army has been made jointly in the office on the basis of data brought together by Miss Cobb.

[1] Cf. chap. 5, page 681.

CHAPTER 2.

A GENERAL METHOD OF STATISTICAL INTERPRETATION OF THE PRINCIPAL SAMPLE.

SECTION 1.—*Statistical interpretation.*

The plan to tabulate on a large scale the data of intelligence examinations obtained in the Army required as its complement an adequate method of interpretation. An ideal method would eliminate irrelevant factors, such as differences in the technique of examination, and permit direct comparison of the subgroups of the tabulated sample with respect to the intellectual ability that is measurable by the Army tests. The problem of interpretation stated in its simplest terms is to combine the results of the several different methods of testing intelligence (i. e., different kinds of examinations) in such a way as to permit the calculation of the more important statistical constants by means of which the quantitative aspects of groups are ordinarily described. Otherwise stated, we require for a given group, part of which has been examined by alpha, part by beta, and part by individual examination, measures of central tendency and variability, which shall be independent of the proportions of the group tested by each of these examinations, for only thus can we directly compare the given group with another group which (for reasons wholly irrelevant to the distribution of intelligence within itself) may be composed of alpha, beta, and individual cases in very different proportions.[1]

At the outset we must set up a certain limitation and we must establish some terms. We are not concerned with the question of the relation of illiteracy to intelligence when we deal with scores in the two group examinations, alpha and beta; for, if the final statistical constants can be freed from the effect of differences in the examination technique they will also be freed from the literacy factors to the extent that these are independent of intelligence. The terms "illiteracy" and "intelligence" are in this connection used in the sense in which they are defined by alpha and beta. "Illiteracy" is to be understood in this chapter as meaning nothing but the inability to read well enough to earn a score in alpha consistent with whatever score in beta the illiterate individual may be capable of earning. What is meant by "consistent with" will appear later in this chapter. By "intelligence" we mean the ability that manifests itself quantitatively in a set of consistent scores in all of the types of examination upon which our data are based.

The problem of combining the data obtained from the different examinations demands the discovery of some sort of "common denominator." Our definition of intelligence [2] immediately suggests the nature of the most probably valid "common denominator," viz, a composite scale formed by pooling the alpha, beta, and individual examinations. Thus, if an individual has actually taken all the different examinations we consider his best rating to be given by the sum of all his scores. Lacking an "outside criterion" of intelligence we are unable to determine the relative weights to be assigned to scores in the different types of tests and we therefore adopt the simplest policy, that of adding them together unweighted.

As a matter of fact, however, almost no individual was given all forms of examination, except in the case of a small special group (Group X) described in this volume, Chap. I, sec. 2. Therefore in order to rate all individuals on a scale which is based upon all examinations, it will be necessary in most cases to calculate from the earned score in some one examination probable scores in the remaining examinations and add these calculated scores to the earned scores. Such procedure would require all the possible regression equations connecting the different variables (scores in different examinations) and would be a simple treatment of the data, or not, according to the degree of difficulty experienced in obtaining satisfactory regression equa-

[1] Prof. Raymond Pearl kindly advised the Section of Psychology concerning the treatment of results.

[2] No attempt is made here to give a novel definition of intelligence; but clearly a definition of intelligence in terms other than those in which our data are given would be useless. We therefore propose to avoid circumlocution by using the word "intelligence" to refer to the ability that has actually been measured, without concerning ourselves about the theoretical problem of what types of potentiality for reaction may be properly included under the term "intelligence" in its technical sense.

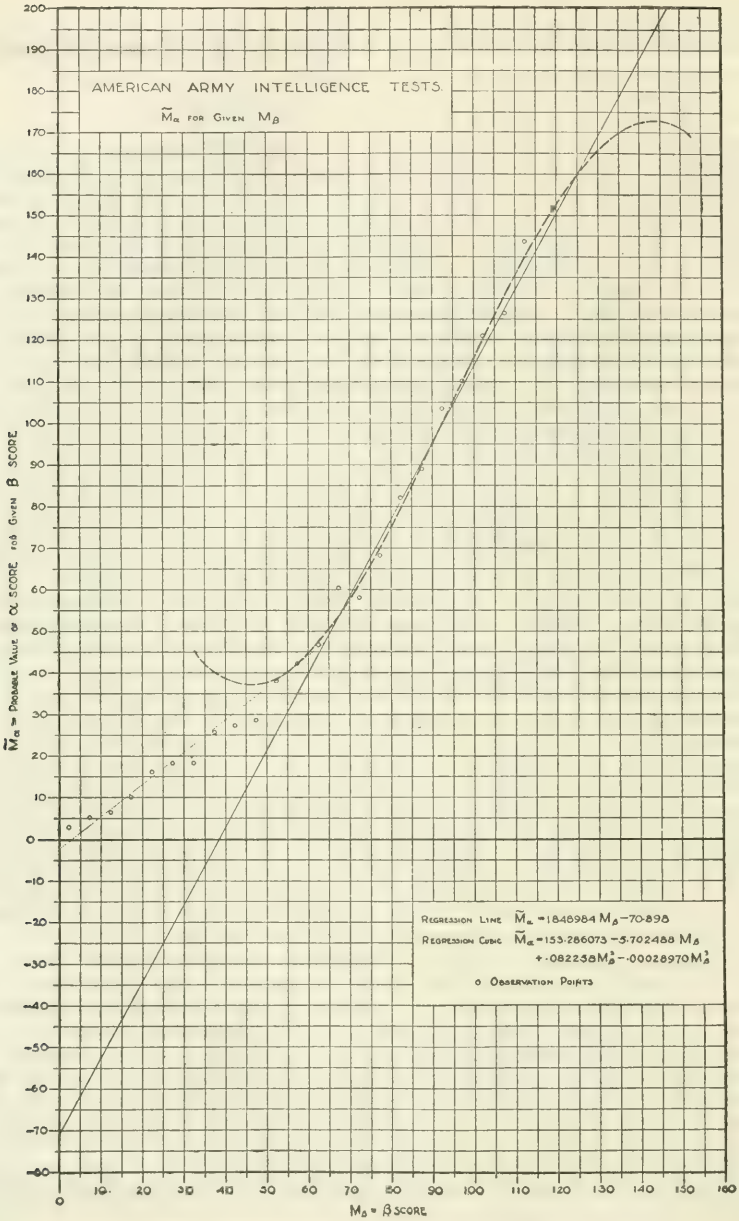


FIG. 1. Regression of examination alpha on examination beta prepared by Prof. Karl Pearson.

tions. As a matter of fact, the relationship between alpha total scores and beta total scores, treated as simple variables, is of such a nature that it is very doubtful if good regression equations can be obtained.

Prof. Karl Pearson has very kindly attempted this problem. Using contingency tables for total scores only he has obtained the equations and curves shown in figures 1 and 2. His material included, besides the data of the special experimental Group X, data from a more highly selected group of 1102 infantrymen from Camp Meade. The equation for the regression of beta on alpha gives very good results both as a fit to the observation points and, as nearly as can be judged, as an extrapolation curve. But Prof. Pearson, however, points out an important difficulty in dealing with the other regression, that of alpha on beta. He considers (with excellent grounds as will appear later) it unsafe to calculate mean alpha scores for beta arrays below 50 points. (Table 154.) The cubic equation fitted to the arrays above 50 turns out to be impossible as an extrapolation curve, while a straight line serves practically as well within the range for which the cubic is satisfactory, and probably gives good results in extrapolation. Using this straight line for extrapolation we find an alpha score of about −71 for a beta score of zero.

Unfortunately, Prof. Pearson was not provided with distributions and contingency tables for scores in the component tests of alpha and beta, analysis of which shows clearly the nature of the relationship between alpha and beta total scores, and suggests a method of avoiding some of the difficulties met in treating total scores as simple variables.

From Group X of the principal sample, contingency tables for all pairs of variables, i. e., eight alpha tests, seven beta tests, Stanford-Binet mental age ratings, and each of these with total alpha score and total beta score, have been obtained. Of these tables those showing contingency of each beta test with Stanford-Binet mental age and of total beta score with Stanford-Binet mental age are shown in Part II, chapter 7, table 52. The other contingency tables are printed herewith as tables 10 to 154. The distribution of scores in each test and examination is shown by the histograms of figures 3, 4, and 5.

Table 10.—*Variables: Alpha score, test 1 × alpha score, test 2. Group X: Special experimental group.*

ALPHA TEST 2.

ALPHA TEST 1.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	*f*
12	....	....	....	....	....	....	1	....	....	1	....	4	....	3	1	....	2	....	....	....	....	12
11	....	....	....	....	....	....	....	....	1	....	3	4	6	....	2	4	3	....	5	....	....	28
10	....	....	....	....	....	2	1	1	2	7	4	10	8	8	6	1	2	....	....	....	....	52
9	....	....	....	....	2	1	....	3	7	4	9	13	8	5	4	6	5	....	....	....	....	67
8	....	....	....	2	1	2	6	4	9	12	9	12	10	7	4	2	1	1	....	....	....	82
7	....	....	3	1	4	8	5	4	20	12	12	14	5	1	3	1	....	1	....	....	....	94
6	1	1	1	3	9	5	13	18	17	17	17	11	11	4	2	1	....	....	....	....	....	131
5	6	....	7	4	12	10	16	18	15	15	6	7	4	....	....	1	....	....	....	....	....	121
4	5	1	5	5	6	14	14	11	18	8	8	5	....	....	....	....	....	....	....	....	....	100
3	5	9	8	14	8	14	16	15	10	11	1	1	....	1	....	....	....	....	....	....	....	116
2	5	4	13	15	17	8	11	8	5	3	4	....	....	....	....	....	....	....	....	....	....	93
1	16	12	9	8	6	7	8	7	1	3	....	....	1	....	....	....	....	....	....	....	....	78
0	28	11	5	6	5	6	4	5	1	2	....	....	....	....	....	....	....	....	....	....	....	73
f	66	38	51	58	70	77	95	94	106	95	76	81	53	29	22	16	13	2	5	....	....	

Table 11.—*Variables: Alpha score, test 1 × alpha score, test 3. Group X: Special experimental group.*

ALPHA TEST 3.

ALPHA TEST 1.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	*f*
12	....	....	....	....	....	1	....	....	2	2	3	2	....	1	1	....	....	12
11	....	....	....	....	....	1	....	3	4	1	7	2	2	5	1	1	1	28
10	1	....	....	....	....	....	4	7	6	9	7	4	8	5	1	....	....	52
9	....	....	....	....	1	3	3	14	5	13	3	9	7	4	2	3	....	67
8	....	....	....	4	6	6	6	8	15	8	11	3	3	3	4	5	....	82
7	3	3	....	3	7	8	14	14	12	9	5	6	3	3	2	2	....	94
6	6	2	1	4	11	12	12	28	21	15	9	8	....	....	1	....	1	131
5	7	1	8	13	16	16	14	15	12	6	5	....	2	2	....	1	....	121
4	16	....	6	7	7	14	11	12	8	7	3	2	2	....	1	1	....	100
3	19	3	11	10	12	15	11	12	11	4	....	1	1	1	....	....	....	116
2	32	9	12	12	9	2	2	5	4	3	....	....	1	2	....	....	....	93
1	35	18	7	3	4	2	5	....	3	....	1	....	....	....	....	....	....	78
0	44	13	4	2	2	2	3	2	....	1	....	....	....	....	....	....	....	73
f	163	61	49	58	75	82	85	120	103	77	54	37	29	26	13	13	2	

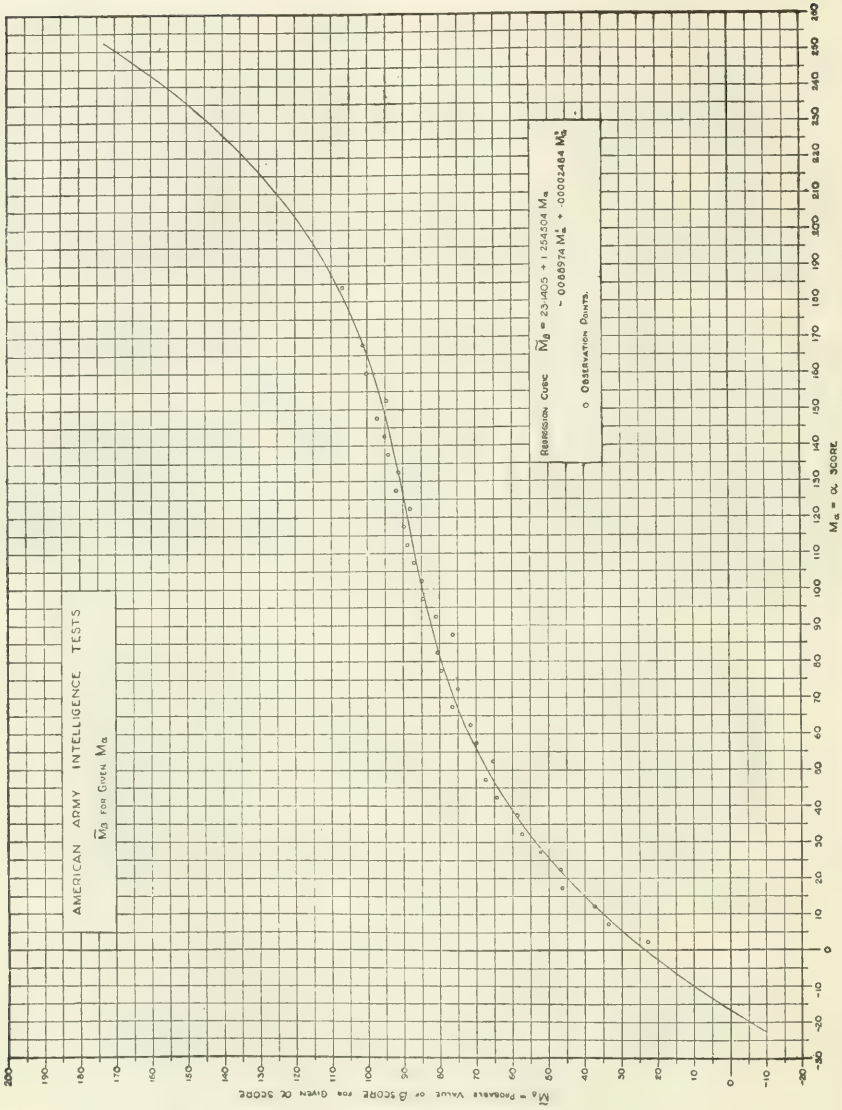


FIG. 2. Regression of examination beta on examination alpha prepared by Prof. Karl Pearson.

Table 12.—*Variables: Alpha score, test 1 × alpha score, test 4. Group X: Special experimental group.*

ALPHA TEST 4.

ALPHA TEST 1	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	f
12	....	....	....	....	....	....	....	1	2	1	4	....	....	....	1	2	....	....	....	1	....	12
11	....	....	....	2	....	....	1	4	2	3	2	....	3	....	3	4	2	....	....	1	1	28
10	1	1	1	2	2	3	3	3	7	5	4	4	9	5	....	1	....	....	1	....	....	52
9	4	1	1	2	2	1	4	7	6	8	10	10	1	3	1	5	1	....	....	....	....	67
8	7	3	10	7	6	6	1	9	6	6	3	2	5	5	4	....	1	1	....	....	....	82
7	20	2	7	4	7	10	10	10	6	5	3	3	3	....	2	2	....	....	....	....	....	94
6	35	10	7	6	15	11	14	9	10	9	2	4	6	2	1	....	....	....	....	....	....	131
5	41	15	15	21	4	5	5	5	4	1	3	1	....	....	....	....	1	....	....	....	....	121
4	12	13	5	10	4	9	6	3	4	2	2	....	....	....	....	....	....	....	....	....	....	100
3	39	11	8	9	6	7	4	3	5	2	....	1	1	....	....	....	....	....	....	....	....	116
2	63	9	5	6	3	2	1	2	2	....	....	....	....	....	....	....	....	....	....	....	....	93
1	63	8	3	2	....	....	....	1	....	....	....	....	1	....	....	....	....	....	....	....	....	78
0	68	1	2	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	73
f	393	74	64	73	49	54	49	57	54	42	33	25	29	15	12	14	5	1	1	2	1	

Table 13.—*Variables: Alpha score, test 1 × alpha score, test 5. Group X: Special experimental group.*

ALPHA TEST 5.

ALPHA TEST 1.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	f
12	....	....	....	....	....	....	1	1	....	....	....	....	1	....	1	3	2	....	1	1	1	....	....	....	....	12
11	....	....	....	....	....	1	....	....	1	1	....	....	3	1	....	2	3	1	3	....	2	2	....	....	....	28
10	1	1	....	1	....	....	1	....	3	5	2	2	3	7	4	4	5	5	....	1	4	1	1	....	....	52
9	4	....	....	....	2	....	....	2	3	4	6	7	7	3	6	5	4	1	4	2	1	1	1	3	1	67
8	3	3	1	2	3	2	4	4	7	4	3	4	9	7	3	3	1	2	3	2	3	3	3	....	1	82
7	11	1	4	1	6	4	6	1	6	6	9	6	11	3	4	5	3	1	2	2	....	....	....	1	1	94
6	19	1	5	4	4	6	9	10	10	4	12	10	9	7	9	3	3	1	2	1	2	....	....	....	....	131
5	26	9	5	7	15	11	8	6	3	7	3	7	3	3	3	2	....	2	....	....	1	....	....	....	....	121
4	26	12	5	9	7	6	4	4	10	2	2	5	2	1	2	1	1	....	....	....	....	1	....	....	....	100
3	32	8	8	8	8	10	7	5	6	6	3	6	2	2	2	1	....	....	....	1	1	....	....	....	....	116
2	37	2	13	7	9	2	4	4	5	3	4	1	....	....	....	1	1	....	....	....	....	....	....	....	....	93
1	35	5	9	3	6	7	4	2	3	1	1	1	....	....	....	1	....	....	....	....	....	....	....	....	....	78
0	48	4	4	4	2	1	4	2	2	....	1	....	....	1	....	....	....	....	....	....	....	....	....	....	....	73
f	244	46	54	46	62	50	52	42	59	43	47	49	50	35	34	31	23	13	15	10	15	7	11	4	5	

Table 14.—*Variable: Alpha score, test 1 × alpha score, test 6. Group X: Special experimental group.*

ALPHA TEST 6.

ALPHA TEST 1.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	f
12	....	....	....	....	....	....	1	....	2	....	1	3	3	1	1	....	....	....	....	....	....	12
11	....	....	....	....	....	....	....	1	....	2	5	9	2	1	1	4	2	1	....	....	....	28
10	1	1	....	....	....	1	2	2	3	8	13	6	6	3	1	2	....	3	....	....	....	52
9	1	2	....	1	1	2	1	5	3	12	12	10	6	5	3	2	1	....	....	....	....	67
8	2	1	1	2	5	3	4	7	11	11	12	7	11	2	1	1	....	1	....	....	....	82
7	4	4	1	4	5	11	10	6	10	13	11	9	1	3	1	....	....	....	1	....	....	94
6	5	12	4	14	6	9	10	20	10	20	11	4	3	2	1	....	....	....	....	....	....	131
5	13	13	7	7	11	21	9	10	7	8	6	4	3	1	....	1	....	....	....	....	....	121
4	12	12	9	11	9	7	11	8	8	5	6	1	....	....	....	....	1	....	....	....	....	100
3	24	12	12	5	8	11	14	10	6	6	1	4	2	....	1	....	....	....	....	....	....	116
2	32	13	13	6	4	10	1	6	6	2	....	....	....	....	....	....	....	....	....	....	....	93
1	33	14	10	6	3	6	3	1	....	2	....	....	....	....	....	....	....	....	....	....	....	78
0	50	7	7	3	....	2	3	1	....	....	....	....	....	....	....	....	....	....	....	....	....	73
f	177	91	64	59	52	33	69	77	66	89	78	57	37	18	10	10	4	5	1	....	....	

Table 15.—*Variable: Alpha score, test 1 × alpha score, test 7. Group X: Special experimental group.*

ALPHA TEST 7.

ALPHA TEST 1.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	f
12	....	....	....	1	....	....	4	1	....	....	....	1	1	1	1	....	1	....	1	....	....	12
11	....	....	....	1	1	....	....	....	3	1	2	1	3	3	4	3	2	2	1	....	....	28
10	....	....	2	5	6	7	3	4	....	3	5	5	3	2	3	2	....	2	....	....	....	52
9	1	2	6	8	5	5	5	6	5	4	4	4	4	3	2	3	1	1	....	2	1	67
8	5	11	9	4	8	6	6	12	2	4	2	7	1	....	1	....	4	....	....	....	....	82
7	10	13	11	11	14	10	9	7	2	4	2	....	....	....	....	....	....	1	....	....	....	94
6	12	23	22	23	19	9	7	5	2	2	2	1	1	1	....	1	....	....	....	....	....	131
5	23	30	18	11	10	7	6	1	1	....	....	....	1	....	....	....	1	....	....	....	....	121
4	32	20	15	9	8	5	4	5	2	....	....	....	....	....	....	....	....	....	....	....	....	100
3	44	24	17	9	10	6	3	....	2	....	1	....	....	....	....	....	....	....	....	....	....	116
2	49	16	20	3	1	1	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....	93
1	49	17	2	7	2	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	78
0	59	6	5	2	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	73
f	284	162	127	98	91	57	52	40	18	18	18	19	13	9	12	7	9	5	4	1	....	

TABLE 16.—*Variable: Alpha score, test 1 × alpha score, test 8. Group X: Special experimental group.*

ALPHA TEST 8.

ALPHA TEST 1.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40–1	*f*
12	....	....	....	....	....	1	....	....	....	1	....	2	....	3	1	1	1	1	1	....	....	12
11	....	....	....	....	....	....	2	2	3	....	1	2	....	4	....	....	3	6	3	2	....	28
10	....	....	....	1	1	1	1	1	5	7	6	2	7	4	5	4	4	....	1	2	....	52
9	....	....	....	1	2	1	4	3	7	5	6	7	9	4	7	5	3	2	1	....	....	67
8	....	1	1	7	5	3	7	6	4	5	6	6	8	7	5	2	3	3	3	....	....	82
7	2	....	4	7	5	9	10	7	10	8	3	5	4	5	8	3	2	1	1	....	....	94
6	4	3	6	8	9	19	9	14	12	7	10	2	8	5	6	6	2	1	....	....	....	131
5	8	5	16	19	10	15	7	6	12	6	6	5	2	....	1	....	2	1	....	....	....	121
4	10	9	9	10	9	10	5	7	7	10	3	1	5	2	2	1	....	....	....	....	....	100
3	20	10	11	20	9	10	11	7	4	5	5	1	1	....	1	1	....	....	....	....	....	116
2	27	13	13	7	6	8	6	1	4	4	....	3	....	....	....	1	....	....	....	....	....	93
1	37	10	3	11	4	4	3	1	....	3	....	1	....	....	....	....	1	....	....	....	....	78
0	51	4	6	3	3	1	3	1	1	....	....	....	....	....	....	....	....	....	....	....	....	73
f	159	55	69	94	63	82	68	56	69	61	46	37	44	34	36	24	21	15	10	4	....	

TABLE 17.—*Variable: Beta score, test 1 × alpha score, test 1. Group X: Special experimental group.*

ALPHA TEST 1.

BETA TEST 1.	0	1	2	3	4	5	6	7	8	9	10	11	12	*f*
10	1	3	3	8	3	3	12	11	17	12	10	7	5	95
9	2	3	6	14	9	17	18	16	17	14	15	5	2	138
8	9	10	5	23	26	26	29	26	25	17	11	9	2	218
7	11	13	14	25	12	30	22	14	11	12	7	3	2	176
6	7	3	16	15	20	14	21	12	7	6	7	1	1	130
5	12	14	12	7	9	9	9	8	....	3	1	1	....	85
4	10	8	20	5	7	8	8	4	2	2	1	....	....	75
3	8	6	5	10	3	6	6	2	1	....	....	1	....	48
2	6	10	6	3	7	2	3	1	1	1	....	1	....	41
1	2	4	3	3	2	5	3	....	....	....	....	....	....	22
0	5	4	3	3	2	1	....	....	1	....	....	....	....	19
f	73	78	93	116	100	121	131	94	82	67	52	28	12	

TABLE 18.—*Variables: Beta score, test 2 × alpha score, test 1. Group X: Special experimental group.*

ALPHA TEST 1.

BETA TEST 2.	0	1	2	3	4	5	6	7	8	9	10	11	12	*f*
16	....	....	1	1	2	2	5	4	4	6	2	6	3	36
15	....	1	....	2	2	5	11	9	14	7	9	1	1	62
14	....	4	3	2	6	6	10	13	15	8	10	9	3	89
13	2	2	2	5	6	13	18	17	10	13	8	6	2	104
12	1	2	6	7	10	12	14	8	11	6	5	3	1	86
11	1	6	10	11	12	12	13	8	12	8	5	....	1	99
10	....	7	7	12	10	12	8	9	5	7	4	2	....	83
9	1	2	9	15	5	12	9	5	3	3	4	1	1	70
8	5	4	12	11	6	8	8	2	1	....	3	....	....	60
7	7	4	6	5	1	12	10	5	2	3	....	....	....	55
6	6	7	....	9	8	3	4	2	....	....	....	....	....	39
5	6	6	9	6	7	6	5	3	1	....	1	....	....	50
4	10	6	4	7	7	3	4	3	....	2	1	....	....	47
3	7	9	6	7	3	2	3	3	....	....	....	....	....	40
2	3	6	3	5	6	7	....	1	1	....	....	....	....	32
1	10	7	7	2	4	2	5	1	1	2	....	....	....	41
0	14	5	8	9	5	4	4	1	2	2	....	....	....	54
f	73	78	93	116	100	121	131	94	82	67	52	28	12	

TABLE 19.—*Variables: Beta score, test 3 × alpha score, test 1. Group X: Special experimental group.*

ALPHA TEST 1.

BETA TEST 3.	0	1	2	3	4	5	6	7	8	9	10	11	12	*f*
12	....	....	2	3	3	4	10	12	20	20	9	10	3	96
11	....	....	2	6	5	10	13	11	17	16	11	10	3	104
10	1	2	7	8	10	22	26	27	19	16	17	5	5	165
9	4	3	4	13	22	18	20	14	11	8	6	....	1	124
8	1	6	9	8	9	10	13	5	8	2	3	....	....	74
7	2	2	6	13	5	8	6	2	2	1	1	1	....	49
6	2	4	4	6	5	6	10	7	1	1	1	2	....	49
5	3	9	9	13	8	12	11	3	2	1	2	....	....	73
4	6	2	7	11	6	9	5	3	1	1	....	....	....	51
3	4	4	7	10	10	2	4	1	1	....	1	....	....	44
2	12	17	17	9	8	5	4	3	....	....	....	....	....	75
1	14	13	10	12	5	7	5	4	....	....	1	....	....	71
0	24	16	9	4	4	8	4	2	....	1	....	....	....	72
f	73	78	93	116	100	121	131	94	82	67	52	28	12	

TABLE 20.—*Variables: Beta score, test 4 × alpha score, test 1. Group X: Special experimental group.*

ALPHA TEST 1.

BETA TEST 4.	0	1	2	3	4	5	6	7	8	9	10	11	12	*f*
30	...	...	...	...	1	1	2	3	3	3	3	1	2	1	20
28–29	...	...	...	...	...	1	...	2	...	4	...	1	...	1	9
26–27	...	...	...	...	...	1	1	...	1	4	7	2	2	...	18
24–25	...	...	...	...	3	2	1	4	3	11	7	2	3	1	41
22–23	...	...	...	...	1	4	1	11	6	13	5	2	4	2	49
20–21	...	...	...	2	5	2	10	7	10	4	14	19	5	4	82
18–19	1	3	1	6	10	10	15	11	8	8	1	2	2	2	81
16–17	...	2	9	11	12	13	23	15	11	12	2	7	...	...	117
14–15	3	7	11	15	16	21	17	14	9	5	7	3	1	...	129
12–13	3	4	9	12	12	13	16	9	6	5	1	...	...	...	93
10–11	5	8	12	17	7	13	14	11	6	1	3	...	...	...	97
8– 9	2	9	7	16	6	12	7	3	2	...	...	...	...	...	64
6– 7	4	19	12	7	7	10	6	4	1	...	...	1	...	...	62
4– 5	11	6	8	6	12	5	2	1	...	...	...	...	...	...	51
2– 3	15	12	3	8	3	5	2	...	...	...	...	...	...	...	50
0– 1	25	17	10	8	4	4	2	3	...	...	2	...	...	...	84
f	75	78	93	116	100	121	131	94	82	67	52	28	12		

TABLE 21.—*Variables: Alpha score, test 1 × beta score, test 5. Group X: Special experimental group.*

BETA TEST 5.

ALPHA TEST 1.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	*f*
12	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	2	...	...	1	4	...	2	1	1	...	...	12
11	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	2	...	3	3	4	...	1	7	...	2	1	28
10	...	...	...	1	...	1	...	1	...	...	1	2	1	2	5	2	3	3	8	3	4	5	2	3	5	1	52
9	...	...	...	2	1	...	1	1	...	...	2	1	5	3	6	4	3	7	8	8	4	3	2	3	4	...	67
8	...	...	...	...	...	1	1	...	1	3	2	2	2	2	4	8	13	9	8	5	2	6	9	2	2	1	82
7	...	...	...	...	...	1	2	...	4	3	5	1	5	9	14	6	5	9	6	7	5	2	3	1	1	1	94
6	...	...	1	...	1	...	5	1	1	7	6	6	9	13	14	12	11	11	8	3	1	7	...	4	5	1	131
5	3	...	2	2	1	2	4	8	3	7	6	6	10	10	11	6	4	9	11	5	2	3	1	2	1	2	121
4	2	...	3	1	2	3	4	7	3	6	7	2	6	6	10	5	5	4	8	3	2	2	5	3	1	...	100
3	8	1	3	2	...	1	4	4	8	6	6	9	12	7	8	9	7	7	1	2	2	2	1	6	...	...	116
2	9	2	4	5	4	1	6	2	6	9	6	4	7	3	8	5	2	3	3	2	1	1	...	...	...	...	93
1	11	8	8	2	2	1	7	4	3	3	5	6	1	5	3	1	...	3	3	...	...	...	1	...	1	...	78
0	22	6	3	1	7	1	3	4	5	4	...	5	3	2	2	3	...	1	1	...	...	...	...	...	...	...	73
f	55	17	24	15	19	9	31	37	34	41	43	49	52	55	72	76	59	65	70	61	32	33	39	30	18	20	

TABLE 22.—*Variables: Alpha score, test 1 × beta score, test 6. Group X: Special experimental group.*

BETA TEST 6.

ALPHA TEST 1.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	*f*
12	...	...	...	...	...	...	...	...	...	...	...	...	1	2	2	5	...	...	...	1	1	12
11	...	...	...	...	...	...	...	...	...	1	2	2	...	2	5	...	4	7	2	...	3	28
10	...	...	...	...	...	...	...	1	...	...	1	4	4	3	10	7	7	7	6	...	2	52
9	...	...	...	...	...	...	...	...	1	3	2	3	7	11	8	7	9	6	6	4	1	67
8	...	...	...	1	1	...	...	2	3	3	3	5	3	6	11	13	11	8	7	6	...	82
7	...	...	...	...	...	...	1	3	2	4	4	8	8	11	14	10	12	3	4	6	1	94
6	...	...	...	...	...	2	1	1	2	7	7	10	12	20	16	13	13	16	5	3	1	2	131
5	...	...	...	...	...	...	1	4	6	5	14	10	11	9	20	13	11	6	5	2	3	1	121
4	...	...	...	1	...	1	2	2	5	3	10	10	11	9	7	9	9	13	3	2	3	1	100
3	...	1	2	...	...	1	...	7	11	8	14	12	14	12	9	5	3	5	4	...	1	116
2	1	1	1	3	2	...	7	5	15	12	4	11	4	4	4	5	1	6	2	1	...	1	93
1	2	2	2	1	5	1	6	8	9	10	12	7	4	4	1	1	1	3	...	...	...	...	78
0	9	1	3	4	5	6	5	3	8	9	5	7	3	3	1	...	...	...	1	...	...	...	73
f	12	5	9	9	16	18	33	42	63	81	77	93	86	101	101	82	90	51	37	24	17	

TABLE 23.—*Variables: Beta score, test 7 × alpha score, test 1. Group X: Special experimental group.*

ALPHA TEST 1.

BETA TEST 7.	0	1	2	3	4	5	6	7	8	9	10	11	12	*f*
10	2	3	3	3	5	6	12	6	22	15	13	8	7	105
9	1	1	...	5	7	15	12	14	9	15	12	7	4	102
8	2	1	5	5	9	11	8	10	8	6	5	5	1	76
7	1	4	6	11	7	8	15	13	14	15	6	3	...	106
6	4	3	8	10	17	21	20	13	7	3	6	1	...	113
5	3	9	8	21	14	18	22	9	13	10	5	2	...	137
4	8	5	11	15	12	19	15	13	6	1	2	1	...	99
3	8	11	11	6	13	9	12	5	...	...	1	...	...	76
2	8	4	12	13	4	11	3	4	1	2	1	1	...	84
1	8	17	13	5	8	4	5	4	1	...	...	...	...	65
0	28	20	16	16	4	8	7	3	1	...	1	1	...	105
f	73	78	93	116	100	121	131	94	82	67	52	29	12	

TABLE 24.—*Variables: Alpha score, test 2 × alpha score, test 3. Group X: Special experimental group.*

ALPHA TEST 3.

ALPHA TEST 2.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	*f*
20																		
19																		
18											1			3		1		5
17															1	1		2
16								1		1	2	2	1	2	3	1		13
15						1		2			4	1	5	1		1	1	16
14								3	6	2	2	3	1	3	2			22
13		1				2		4	5	4	3	5	2	2		1		29
12						1	1	5	8	7	5	7	6	4	4	4	1	53
11					1	1	4	14	15	18	9	8	5	4	1	1		81
10			1	3	5	4	13	11	11	12	4	3	5	2	1	1		76
9	3	1		3	8	7	8	17	17	14	10	3	3	3		1		98
8	6		2	7	9	17	12	17	14	7	8	3				1		103
7	4	5	4	12	13	11	14	15	8	2	3	1	1		1			94
6	13	6	9	6	9	15	13	9	9	2	3			1				95
5	14	5	5	6	11	9	7	9	5	5		1						77
4	16	8	4	8	6	7	9	5	4	3								70
3	12	10	11	4	9	3	3	5	1									58
2	21	12	4	7	2	2		2						1				51
1	25	7	2	2	1			1										38
0	49	6	7		1	2	1											66
f	163	61	49	58	75	82	85	120	103	77	54	37	29	26	13	13	2	

TABLE 25.—*Variables: Alpha score, test 2 × alpha score, test 4. Group X: Special experimental group.*

ALPHA TEST 4.

ALPHA TEST 2.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	*f*
20																						
19																						
18																				1	1	5
17													1		1							2
16							2		1		3	2	1			2	1			1		13
15		2					2		2	3	1	1			1	1	3					16
14	1			1		2		2	3			1	1	4	1	3						22
13	2				1	1	1	3	2	2			5	4	2	3			1			29
12	2			2	3		4	4	4	6	6	5	9	5	1	1	1					53
11	4	2	2	3	3	7	3	9	11	12	10	7	2	1	3	1		1				81
10	11	2	6	5	7	7	6	9	6	5	5	4	3									76
9	12	3	12	10	9	10	8	8	10	4	1	3	1	1	3							95
8	22	9	7	13	7	11	7	12	7	6	3	1	1									106
7	37	14	6	11	4	6	6	4	3		1	1	1									94
6	38	11	4	11	9	3	5	5	3	1	1		4									95
5	40	8	10	6	4	2	5	1	1													77
4	42	10	6	6	2	2	1		1													70
3	41	5	8	2		2																58
2	44	3	2	2																		51
1	35	2		1																		38
0	62	3	1																			66
f	393	74	64	73	49	53	50	57	54	42	33	25	29	15	12	14	5	1	1	2	1	

TABLE 26.—*Variables: Alpha score, test 2 × alpha score, test 5. Group X: Special experimental group.*

ALPHA TEST 5.

ALPHA TEST 2.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	*f*
20																										
19																										
18																					1		3		1	5
17																			1				1			2
16												1	1			1	1	1	1	2	1	1	2		1	13
15	1	1									1					3		3	1	1	1	1	1	2		16
14	2									1	1	2	4		2	1	3		3		1	1				22
13	2							1		2	1	1	3		3	3	2	1		1	2	1	1	1	1	29
12	2							1	5		2	2	5	4	8	5	3	3	7		4		1		1	53
11	2		1		4	1	2	3	5	8	5	5	10	5	6	7	7	2	1	2	2	2		1		81
10	7	1	4	2		3	3	6	8	6	7	4	8	6	3	5	2								1	76
9	8	5	4	4	5	5	8	4	5	5	8	4	5	9	6	1	1	1	1	2	2	1	1			95
8	16	7	1	5	11	5	10	4	9	8	5	10	6	4	1	1	2	1								106
7	16	3	6	7	10	8	1	6	11	3	5	7	3	2	2	1				1	1		1			94
6	21	7	5	4	10	7	11	4	6	4	3	3	3	2	3		1			1						95
5	22	6	7	1	6	9	3	1	4	3	4	6	1	2		1	1									77
4	21	2	4	8	6	6	7	10	2		1	1				2										70
3	20	3	11	8	6	2	1	1	2	1	3															58
2	23	4	7	2	2	4	2	1	2	2	2															51
1	27	4	2	2	1		2																			38
0	54	3	2	3	1		2						1													66
f	244	46	51	46	62	50	52	42	59	43	47	49	50	35	31	31	23	13	15	10	15	7	11	1	5	

TABLE 27.—*Variables: Alpha score, test 2 × alpha score, test 6. Group X: Special experimental group.*

ALPHA TEST 6.

ALPHA TEST 2.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	*f*
20																						
19																						
18													1		1	1	1	1				5
17											1					1						2
16									1			3	3	1	1	2	1	1				13
15					1		1			1	5	1	2	2	1	2						16
14								2	1	4	2	3	1	4	1	1		3				22
13							1	2	2	4	7	6	4	2	1							29
12				3		1	3	4	5	8	6	8	8	2	3	2						53
11		1			1	3	5	6	8	17	16	12	7	2	1	1			1			81
10	3	1	1	2	3	3	7	8	7	10	13	10	3	1			1					76
9	2	10	2	3	5	5	1	13	12	12	13	6	6	1	1							95
8	4	8	5	6	8	10	11	6	15	14	9	9	1	3								106
7	19	8	6	8	7	9	7	11	5	9	2	2										94
6	13	7	7	8	9	17	12	10	6	5	1											95
5	14	7	5	8	8	15	5	7	3	3	2											77
4	12	11	7	5	4	11	7	5	1	2	1						1					70
3	12	11	17	3	5	4	2	3					1									58
2	22	9	6	6	1	2	5															51
1	22	5	6	2		2	1															38
0	52	7	2	4		1																66
f	177	91	64	59	52	83	69	77	66	89	78	57	37	18	10	10	4	5	1			

TABLE 28.—*Variables: Alpha score, test 2 × alpha score, test 7. Group X: Special experimental group.*

ALPHA TEST 7.

ALPHA TEST 2.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	*f*
20																						
19																						
18														1		2			1	1		5
17										1					1							2
16							1	1			4	1		2		1	1	1	1			13
15				1		1		1	4			2	2	2	1	1	1					16
14		1	2	2	1	2	2	1	1	2	1	2	1		2		1	1				22
13	1	1	2	1	2	2	5	1	1	1	2	2	2		2	1	3		1			29
12	3	1	2	6	2	1	4	9	1	1	5	3	2	3	2	2	1	2				53
11	1	5	6	11	13	10	7	7		7	2	4	4	1	1		2	1				82
10	7	9	9	11	16	6	6	5	2		1	1			1				1			76
9	14	14	17	13	11	6	5	4	4	2	1	1	2		1							95
8	15	24	16	9	12	7	8	7	4	1		2			1							106
7	19	18	20	11	13	7	4	4		1												94
6	26	22	11	9	9	6	5	2	1	1	2	1										95
5	28	17	14	7	7	3	1															77
4	27	15	12	4	4	3	4	1														70
3	18	19	8	10	2					1												58
2	32	13	4	1	1																	51
1	35	1	1	1																		38
0	59	2	3	1	1																	66
f	284	162	127	98	94	57	52	40	18	18	18	19	13	9	12	7	9	5	4	1		

TABLE 29.—*Variables: Alpha score, test 2 × alpha score, test 8. Group X: Special experimental group.*

ALPHA TEST 8.

ALPHA TEST 2.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	*f*
20																						
19																						
18																		3	1	1		5
17															1		1					2
16													1	1	2	5	1		2	1		13
15							1		2	1	1	3	1		1			1	2	2	1	16
14									1	4	1	2	1	1	1	3	3	1		2	2	22
13			1			1		2	1	1	3	1	2	1	3	5	3	2				29
12				1	1		1	2	3	3	5	6	7	10	1	3	8	2				53
11	1		1	2		2	4	5	8	8	5	7	9	8	9	5	3	3	1			81
10			2	1	3	9	9	6	11	4	8	3	8	3	4	1	1		1			76
9	2	1	7	6	4	10	11	9	9	11	9	3	4	4	3	1	1	1	1			95
8	2	3	8	13	11	12	7	14	10	9	5	2	4	1	4	2	2					106
7	5	7	8	11	9	11	10	4	8	6	1	1	2	1	1							94
6	6	8	8	13	15	13	7	3	4	5	4	1	4		2	3			1			95
5	12	6	6	11	6	7	7	3	6	1	3	2		1								77
4	9	7	10	12	5	7	4	4	5	1		2		1								70
3	14	8	10	7	4	7	4	2	1		1											58
2	22	11	9	5	3		1															51
1	30	3	2	2			1															38
0	56	3	2	2	1		1	1														66
f	159	55	69	94	63	82	68	56	69	61	46	37	44	34	36	24	21	15	10	4		

TABLE 30.—*Variables: Beta score, test 1 × alpha, test 2. Group X: Special experimental group.*

ALPHA TEST 2.

BETA TEST 1.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	*f*
10	....	1	1	1	1	4	5	1	7	11	9	12	16	9	5	4	3	1	4	....	....	95
9	1	2	....	4	9	4	7	16	14	18	10	26	9	5	4	4	3	1	1	....	....	138
8	9	6	6	11	8	13	23	20	33	22	23	12	14	6	4	2	6	....	....	....	....	218
7	8	3	12	7	15	13	19	24	15	13	12	14	4	4	7	5	1	....	....	....	....	176
6	8	7	7	9	11	13	9	11	14	14	8	10	6	2	1	....	....	....	....	....	....	130
5	7	4	7	8	7	11	8	7	8	7	4	4	3	....	....	....	....	....	....	....	....	85
4	11	2	9	11	4	8	9	4	5	1	5	1	....	3	1	1	....	....	....	....	....	75
3	6	6	4	2	5	4	4	5	5	5	2	....	....	....	....	....	....	....	....	....	....	48
2	4	5	3	3	2	4	10	2	2	2	2	1	1	....	....	....	....	....	....	....	....	41
1	3	1	2	2	4	2	1	2	2	2	....	1	....	....	....	....	....	....	....	....	....	22
0	9	1	....	....	4	1	....	2	1	1	....	....	....	....	....	....	....	....	....	....	....	19
f	66	38	51	58	70	77	95	94	106	95	76	81	53	29	22	16	13	2	5	....	....	

TABLE 31.—*Variables: Beta score, test 2 × alpha score, test 2. Group X: Special experimental group.*

ALPHA TEST 2.

BETA TEST 2.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	*f*
16	....	....	....	....	....	....	....	4	1	5	1	7	6	6	2	....	1	1	2	....	....	36
15	....	....	1	....	....	1	4	2	8	8	4	8	6	7	6	4	2	1	....	....	....	62
14	....	....	....	2	2	4	2	6	7	11	11	17	9	4	5	3	4	....	2	....	....	89
13	....	....	....	2	4	5	4	9	10	14	16	13	8	6	6	2	4	....	1	....	....	104
12	....	1	1	3	5	9	10	9	11	8	10	5	8	1	2	2	1	....	....	....	....	86
11	....	....	4	3	7	7	9	13	14	13	11	9	7	....	1	1	....	....	....	....	....	99
10	5	4	1	2	8	5	10	10	16	6	4	4	2	....	1	1	....	....	....	....	....	83
9	3	3	2	6	10	6	9	6	8	3	4	5	1	2	....	2	....	....	....	....	....	70
8	2	2	7	6	8	4	9	8	3	7	2	2	1	....	....	....	....	....	....	....	....	61
7	2	3	6	7	4	3	6	7	4	6	2	3	1	....	....	1	....	....	....	....	....	55
6	6	....	3	5	1	4	6	3	6	2	3	....	....	....	....	....	....	....	....	....	....	39
5	8	5	9	9	4	4	3	2	2	....	....	2	1	....	....	....	....	....	....	....	....	49
4	6	4	4	2	3	7	5	3	4	4	1	4	....	....	....	....	....	....	....	....	....	47
3	5	2	3	4	5	3	2	4	6	3	1	....	1	....	....	....	....	....	....	....	....	40
2	5	5	3	1	3	4	3	3	1	1	3	....	....	....	....	....	....	....	....	....	....	32
1	11	1	3	5	1	5	7	1	2	2	1	2	....	....	....	....	....	....	....	....	....	41
0	12	8	4	1	5	6	6	4	3	2	2	....	....	1	....	....	....	....	....	....	....	54
f	66	38	51	58	70	77	95	94	106	95	76	81	53	29	22	16	13	2	5	....	....	

TABLE 32.—*Variables: Beta score, test 3 × alpha score, test 2. Group X: Special experimental group.*

ALPHA TEST 2.

BETA TEST 3.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	*f*
12	....	....	....	....	1	....	4	2	8	8	9	21	14	6	5	4	8	1	5	....	....	96
11	....	....	1	1	4	4	2	3	11	13	11	16	13	9	9	3	3	1	....	....	....	104
10	....	....	4	4	5	7	14	12	19	24	22	21	11	9	5	6	2	....	....	....	....	165
9	4	....	3	6	5	13	13	15	19	13	11	9	6	4	1	2	....	....	....	....	....	124
8	1	....	3	5	5	8	17	9	9	7	5	2	3	....	....	....	....	....	....	....	....	74
7	2	3	5	3	7	4	6	4	3	5	4	2	....	....	1	....	....	....	....	....	....	49
6	2	....	3	3	4	6	4	8	6	6	3	3	1	....	....	....	....	....	....	....	....	49
5	4	3	5	5	10	7	5	10	8	5	2	5	2	....	1	1	....	....	....	....	....	73
4	2	3	4	1	8	6	7	8	4	3	5	....	....	....	....	....	....	....	....	....	....	51
3	5	3	3	4	4	4	3	8	3	4	1	1	1	....	....	....	....	....	....	....	....	44
2	10	9	5	10	8	6	11	5	7	4	....	....	....	....	....	....	....	....	....	....	....	75
1	12	11	6	7	6	7	5	8	3	2	2	....	1	....	....	....	....	....	....	....	....	71
0	24	6	9	9	3	5	4	2	6	1	1	1	1	....	....	....	....	....	....	....	....	72
f	66	38	51	58	70	77	95	94	106	95	76	81	53	29	22	16	13	2	5	....	....	

TABLE 33.—*Variables: Beta score, test 4 × alpha score, test 2. Group X: Special experimental group.*

ALPHA TEST 2.

BETA TEST 4.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	*f*
30	....	....	....	....	1	....	....	....	1	....	2	2	4	4	....	2	2	1	1	....	20
28–29	....	....	....	....	....	....	....	....	1	1	2	2	2	....	....	....	....	....	1	....	9
26–27	....	....	....	....	....	....	1	1	1	1	1	2	3	2	2	....	1	1	2	....	18
24–25	....	....	....	1	....	1	1	2	5	2	7	8	6	2	4	1	1	....	....	....	41
22–23	....	....	....	....	1	....	3	2	8	7	5	10	5	1	2	3	2	....	....	....	49
20–21	....	....	....	1	....	1	2	3	7	11	8	14	11	6	8	6	4	....	....	....	82
18–19	....	1	....	2	2	2	5	8	15	9	10	16	3	3	2	1	2	....	....	....	81
16–17	1	....	3	3	8	10	15	12	11	11	11	10	11	3	4	3	1	....	....	....	117
14–15	1	2	4	5	7	10	17	15	13	19	16	11	3	3	....	....	....	....	1	....	129
12–13	1	1	1	7	8	10	8	14	18	10	5	4	2	4	....	....	....	....	....	....	93
10–11	3	1	5	7	12	14	15	14	5	14	4	1	1	1	....	....	....	....	....	....	97
8– 9	3	2	10	3	6	9	7	10	8	6	....	....	....	....	....	....	....	....	....	....	64
6– 7	7	6	7	11	7	6	2	5	5	3	2	....	1	....	....	....	....	....	....	....	62
4– 5	11	7	7	4	4	4	7	2	3	....	1	....	1	....	....	....	....	....	....	....	51
2– 3	13	8	7	8	3	3	2	4	1	1	....	....	....	....	....	....	....	....	....	....	50
0– 1	24	10	7	6	11	7	10	2	4	....	2	1	....	....	....	....	....	....	....	....	84
f	66	38	51	58	70	77	95	94	106	95	76	81	53	29	22	16	13	2	5	....	

Table 34.—*Variables: Alpha score, test 2 × beta score, test 5. Group X: Special experimental group.*

BETA TEST 5.

ALPHA TEST 2.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	f
20																											
19																											
18																		1				2	1		1		5
17																					1				1		2
16																1			1	1	1	1	4	2	2		13
15												1				3		2	1	3		1	3			2	16
14																	2	2	4	4	1	3	1	2	2	1	22
13														3	2	1	2	4	4	1		2	4	3	1	2	29
12													3	2	2	5	3	4	6	7	7	3	6	1	2	2	53
11				1				1	1		2	1	3	2	2	5	4	5	13	11	7	6	5	4	3	5	81
10								4	3		1	3	3	6	6	11	8	4	9	6	2	2	1	3	1	3	76
9			1	2			2	2		6	5	2	5	7	9	5	2	10	10	9	5	2	3	4	1	3	95
8			1			2	1	2	2	3	4	6	6	5	14	10	8	9	7	8	3	7	2	4	2		106
7	4			1	4	1	2	3	4	4	3	5	12	5	4	11	7	5	4	5	1	2	1	3	2	1	94
6	1	1	3			2	4	2	3	4	6	9	6	7	9	8	5	5	6	3	3	1	5	2			95
5	6	2	3		1	1	6	2		7	4	5	5	5	9	9	2	5	1	2	1			1			77
4	8			1	1		5	1	3	7	7	2	2	10	7	4	2	4	3				2	1			70
3	1	1	5		5		1	4	4	5	7	6	3	1	3		4	3	1	1		1	1			1	58
2	3	3	1	1	3		1	9	6	4	1	5	3	1	4	2		1									51
1	7	4	3	2	2	1	6	3	3		1	3		1		1	1										38
0	25	6	7	4	3	2	3	4	5	1	2	1	1		1			1									66
f	55	17	24	15	19	9	31	37	34	41	43	49	52	55	72	76	50	65	70	61	32	33	39	30	18	20	

Table 35.—*Variables: Alpha score, test 2 × beta score, test 6. Group X: Special experimental group.*

BETA TEST 6.

ALPHA TEST 2.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	f
20																						
19																						
18																	1	1	1		2	5
17														1		1						2
16														1	2	1	4	1	3	1		13
15				1								1	1	5	2	1	3				2	16
14										1		1	2	2	3		4	5		3	1	22
13										1	1	1	4	3	4	5	4		4		2	29
12									1	2	2	3	3	3	5	7	7	8	6	1	5	53
11							1		2	2	3	5	6	11	12	11	10	5	7	6		81
10					1		1	2	2	5	4	9	5	10	8	2	12	6	4	4	1	76
9		1						3	3	6	10	6	14	8	15	8	8	2	5	4	2	95
8					1	3	3	1	5	5	5	9	11	12	15	15	10	6	2	3		106
7				1	1		1	2	5	10	5	15	9	13	11	8	8	3	1	1		94
6				1		2	5	5	8	6	12	7	9	9	8	9	6	6		1	1	95
5		1	1			1	4	8	5	4	10	10	6	6	3	7	5	2	4			77
4					1		1	7	6	11	7	8	4	8	5	2	5	5				70
3			3		1	2	3	2	6	11	5	6	2	2	6	4	3	1			1	58
2		1	1	3	4	3	4	2	5	6	7	5	5	2	2	1						51
1	1	1	1	2		2	4	4	8	7	2	2	2	2								38
0	11	1	3	1	7	5	6	6	7	1	4	5	3	3								66
f	12	5	9	9	16	18	33	42	63	81	77	53	86	101	101	82	90	51	37	24	17	

Table 36.—*Variables: Beta score, test 7 × alpha score, test 2. Group X: Special experimental group.*

ALPHA TEST 2.

BETA TEST 7.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	f
10			2	2	1	4	4	6	4	15	8	13	16	8	9	5	5	1	2			105
9	1		2		3	1	4	7	12	16	7	14	13	8	4	3	5		2			102
8			3	2	2	5	9	6	13	9	8	10	3	1	2		2		1			76
7	1	2	1	4	8	4	14	11	15	8	11	12	4	5	1	5						106
6		6	2	6	9	15	9	10	13	13	11	11	4	2		1	1					113
5	10	1	6	7	5	6	14	15	20	14	11	12	7	4	4			1				137
4	6	2	3	9	7	8	14	14	12	7	10	3	1		2	1						99
3	4	3	4	9	9	10	5	8	5	7	5	5	2									76
2	7	3	6	6	8	10	7	9	1	2	3	1				1						64
1	15	7	10	6	5	4	8	6	13	3	2											65
0	22	14	12	7	13	10	7	6	8	1			3	1								104
f	66	38	51	58	70	77	95	94	106	95	76	81	53	29	22	16	13	2	5			

TABLE 37.—*Variables: Alpha score, test 3 × alpha score, test 4. Group X: Special experimental group.*

ALPHA TEST 4.

ALPHA TEST 3.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	*f*
16	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	....	....	....	....	2
15	....	....	....	1	....	....	....	....	....	....	3	2	2	....	3	2	....	....	....	....	....	13
14	1	....	....	....	....	....	....	....	1	2	1	....	2	1	4	....	....	....	....	1	....	13
13	1	....	....	1	1	1	....	2	2	1	3	3	3	....	2	3	1	....	....	1	1	26
12	3	....	1	....	....	1	1	2	....	8	2	3	3	1	1	....	2	....	1	....	....	29
11	1	1	....	1	1	....	4	2	3	5	3	5	3	3	3	2	....	....	....	....	....	37
10	1	2	2	....	5	4	6	2	6	6	5	4	6	2	....	1	1	1	....	....	....	54
9	10	....	6	3	4	9	7	7	10	6	8	1	3	2	....	1	....	....	....	....	....	77
8	13	5	3	8	6	9	11	16	8	8	4	2	5	3	....	1	1	....	....	....	....	103
7	23	7	10	11	7	12	7	16	12	6	3	1	2	2	1	....	....	....	....	....	....	120
6	24	5	9	9	11	8	7	3	5	....	....	3	1	....	....	....	....	....	....	....	....	85
5	31	10	7	11	8	5	2	4	3	1	....	....	....	....	....	....	....	....	....	....	....	82
4	28	11	13	8	....	6	2	3	4	....	....	....	....	....	....	....	....	....	....	....	....	75
3	33	8	7	6	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	58
2	29	11	1	5	2	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	49
1	48	6	3	2	....	1	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	61
0	148	7	2	5	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	163
f	393	74	64	73	49	54	49	57	54	42	33	25	29	15	12	11	5	1	1	2	1	

TABLE 38.—*Variables: Alpha score, test 3 × alpha score, test 5. Group X: Special experimental group.*

ALPHA TEST 5.

ALPHA TEST 3.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	*f*
16	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....	....	....	2
15	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	1	....	....	3	1	1	....	2	....	3	....	13
14	1	....	....	....	....	....	....	....	1	....	....	....	1	....	2	1	....	....	2	1	....	1	1	....	2	....	13
13	1	....	....	....	....	....	....	....	3	....	1	2	2	....	2	1	4	1	....	....	4	2	2	1	....	....	26
12	3	1	1	....	....	....	....	....	....	2	....	....	1	2	5	1	5	3	1	....	1	2	....	1	....	....	29
11	3	....	....	....	....	....	1	....	3	2	3	2	3	5	1	2	5	2	....	1	3	....	....	....	....	....	36
10	3	1	1	....	2	3	3	3	1	5	4	1	3	4	3	3	2	1	3	1	3	1	4	....	....	....	54
9	3	1	3	....	1	3	4	5	4	4	11	5	9	3	6	4	3	3	3	1	....	....	....	1	....	....	77
8	12	2	1	....	8	3	6	2	6	7	5	12	8	6	7	8	2	2	1	2	2	1	....	....	....	....	103
7	14	2	5	4	5	6	7	9	12	6	6	13	8	7	3	4	2	1	1	3	....	....	1	1	....	....	120
6	17	5	2	4	4	7	6	4	8	3	6	3	6	4	2	4	....	....	....	....	....	....	....	....	....	....	85
5	17	4	3	5	7	8	4	5	9	2	3	4	5	1	3	2	....	....	....	....	....	....	....	....	....	....	82
4	13	5	7	6	5	3	6	7	7	6	5	3	2	....	....	....	....	....	....	....	....	....	....	....	....	....	75
3	11	3	6	4	8	7	4	5	2	3	....	2	2	1	....	....	....	....	....	....	....	....	....	....	....	....	58
2	14	4	7	5	9	3	3	1	....	2	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	49
1	32	5	4	4	4	4	3	1	2	....	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	61
0	100	13	14	14	9	3	5	....	1	1	1	....	....	1	....	....	....	....	....	....	1	....	....	....	....	....	163
f	244	46	54	46	62	50	52	42	59	43	47	49	50	35	34	31	23	13	15	10	15	7	11	4	5	....	

TABLE 39.—*Variables: Alpha score, test 3 × alpha score, test 6. Group X: Special experimental group.*

ALPHA TEST 6.

ALPHA TEST 3.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	*f*
16	....	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....	....	....	....	....	2
15	1	....	....	....	....	....	....	....	1	1	2	....	2	2	2	2	....	....	....	....	13
14	....	....	1	....	....	....	....	....	4	2	1	2	2	....	1	....	....	....	....	....	13
13	....	1	....	....	....	1	1	....	1	3	2	5	2	1	2	3	1	2	1	....	26
12	1	....	....	....	1	1	....	2	4	1	6	5	5	1	....	1	1	....	....	....	29
11	2	....	1	....	2	....	1	3	2	4	10	5	2	2	1	1	....	1	....	....	37
10	1	3	....	2	....	....	3	1	6	7	13	3	9	2	....	2	1	1	....	....	54
9	2	6	2	1	3	5	7	6	6	8	11	9	6	4	....	....	....	1	....	....	77
8	6	5	2	5	5	8	8	8	11	15	12	9	3	3	3	....	....	....	....	....	103
7	6	6	5	11	7	8	10	19	10	15	11	7	2	2	....	1	....	....	....	....	120
6	7	6	5	3	5	8	13	8	6	11	5	6	....	1	1	....	....	....	....	....	85
5	5	8	6	5	10	13	8	11	5	5	1	3	1	....	....	....	1	....	....	....	82
4	4	7	10	8	9	10	4	4	2	11	3	3	....	....	....	....	....	....	....	....	75
3	9	9	5	7	6	6	3	8	4	....	....	....	1	....	....	....	....	....	....	....	58
2	13	7	7	3	....	6	4	4	2	1	1	....	1	....	....	....	....	....	....	....	49
1	26	11	8	4	....	7	3	1	1	....	....	....	....	....	....	....	....	....	....	....	61
0	94	22	12	10	4	10	4	2	1	4	....	....	....	....	....	....	....	....	....	....	163
f	177	91	64	59	52	83	69	77	66	89	78	57	37	18	10	10	4	5	1	....	

TABLE 40.—*Variables: Alpha score, test 3 × alpha score, test 7. Group X: Special experimental group.*

ALPHA TEST 7.

ALPHA TEST 3.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	*f*
16													1	1								2
15							1	2	3		2	1	1		1			1	1			13
14				1	1	1	2	2		1	2			2					1			13
13	1				1	1	5	1		2	3	1	5	1	1	2	1	1				26
12		2	1	3	2	2	5	3	1	1	2	1		3								29
11	2	5	1	6	2	4	1	2		3			1		1	2		1	2			37
10	1	3	10	1	6	5	5	2	2	1	2	1	1		2	2	1	2		1		54
9	8	7	7	6	6	9	8	6	5		4	7	2	1			1					77
8	9	12	10	13	19	13	5	8	1	5	1	3	1		3							103
7	12	16	24	19	16	11	5	4	2	4	1	3		1		1	1					120
6	12	16	16	9	15	4	3	5	1	1	1	1					1					85
5	18	18	15	7	13	1	4	2	1				1		1		1					82
4	19	18	14	8	7	2	6		1													75
3	21	14	10	8	2	1	2															58
2	19	18	5	6					1													49
1	37	11	7	3	1	2																61
0	126	21	7	5	3	1																163
f	285	161	127	98	94	57	52	40	18	18	18	19	13	9	12	7	9	5	4	1		

TABLE 41.—*Variables: Alpha score, test 3 × alpha score, test 8. Group X: Special experimental group.*

ALPHA TEST 8.

ALPHA TEST 3.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	*f*
16																	1			1		2
15								7				1	1	4	1		2	3		1		13
14										1			2		4	1		2	3			13
13			1							1	2	5		2	4	4	2	3	1	1		26
12				1					2		1	3	6	3	4		6	2	1			29
11							2		1	2	5	4	7	4	1	5	3	2		1		37
10				1		1	3	5	6	3	5	5	3	9	3	2	2	3	3			54
9				2	1	4	8	3	16	5	7	8	6	3	5	6	3					77
8	1		1	1	6	6	7	12	14	18	5	4	7	7	8	4	2					103
7	3	2	2	8	8	13	14	13	14	8	15	4	6	2	4	2			2			120
6	1	3	2	12	8	10	13	9	4	14	1	1	5		2							85
5	3	3	9	18	12	15	4	6	5	3	2	1	1									82
4	5	3	11	15	7	11	8	5	5	3	1	1										75
3	4	6	13	10	5	8	4	2	1	3	2											58
2	12	10	9	5	7	5	1															49
1	23	12	8	8	2	4	3	1														61
0	107	16	13	13	7	5	1		1													163
f	159	55	69	94	63	82	68	56	69	61	46	37	44	34	36	24	21	15	10	4		

TABLE 42.—*Variables: Beta score, test 1 × alpha score, test 3. Group X: Special experimental group.*

ALPHA TEST 3.

BETA TEST 1.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	*f*
10	2	3	1		2	8	5	11	15	8	11	8	8	8	3	4		95
9	5	3	6	4	8	8	16	17	17	15	14	9	7	5	2	2		138
8	22	6	9	7	19	24	20	32	24	16	7	11	5	6	4	4	2	218
7	22	13	10	13	15	10	20	18	16	17	9	4	3	2	2	2		176
6	20	8	5	12	12	7	10	21	11	8	6	2	4	2	1	1		130
5	16	11	3	7	8	7	5	6	8	6	2	3	1	2				85
4	27	3	9	5	5	5	4	6	3	3	3			1	1			75
3	17	5	3	3	2	7	2		5	3	1							48
2	15	4	1	4	1	4	1	4	2	1	1	2	1					41
1	6	3	1	2	1	2	2	4	1									22
0	11	2	1	1	2			1	1									19
f	163	61	49	58	75	82	85	120	103	77	54	37	29	26	13	13	2	

TABLE 43.—*Variables: Beta score, test 2 × alpha score, test 3. Group X: Special experimental group.*

ALPHA TEST 3

BETA TEST 2.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	*f*
16	....	....	....	1	3	3	....	5	5	3	5	1	3	2	....	5	....	36
15	2	....	....	....	4	3	5	10	8	7	7	6	2	3	3	1	1	62
14	3	2	1	1	2	3	15	10	12	12	8	5	4	4	3	4	....	89
13	1	1	2	1	8	3	11	19	15	9	6	6	6	8	3	3	....	104
12	4	4	3	3	6	6	8	16	11	7	7	1	1	3	2	....	1	86
11	6	4	5	6	6	9	11	10	15	11	5	4	4	3	....	....	....	99
10	10	2	4	9	6	11	5	12	9	6	2	1	5	1	....	....	....	83
9	7	2	5	6	5	5	8	9	5	9	3	5	1	....	....	....	....	70
8	13	4	4	11	6	3	3	5	4	2	3	1	1	1	....	....	....	61
7	12	4	5	5	5	5	4	6	4	2	1	1	1	....	....	....	....	55
6	10	3	2	1	5	5	2	6	2	1	2	....	....	....	....	....	....	39
5	13	12	5	3	3	7	2	2	1	1	....	....	....	....	....	....	....	49
4	11	6	2	2	5	4	5	3	4	1	2	1	1	....	....	....	....	47
3	13	7	2	2	2	2	4	1	1	2	2	1	....	1	....	....	....	40
2	11	4	3	1	3	4	1	2	2	....	....	....	....	....	1	....	....	32
1	19	5	....	1	3	5	....	3	1	2	1	1	....	....	1	....	....	41
0	28	1	6	5	3	2	1	2	1	2	....	3	....	....	....	....	....	54
f	163	61	49	58	75	82	85	120	103	77	54	37	29	26	13	13	2	

TABLE 44.—*Variables: Beta score, test 3 × alpha score, test 3. Group X: Special experimental group.*

ALPHA TEST 3.

BETA TEST	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	*f*
12	....	....	2	2	3	13	1	0	14	14	9	11	6	11	3	6	1	96
11	1	....	1	2	5	7	8	12	14	11	11	5	9	6	5	4	....	104
10	1	1	3	3	8	12	18	25	25	18	21	11	6	7	3	2	1	165
9	4	2	5	9	13	15	14	21	15	13	5	4	2	1	....	1	....	124
8	9	3	5	7	8	6	13	14	4	2	1	1	1	1	....	....	....	74
7	9	4	3	4	6	4	8	3	4	1	3	....	....	....	....	....	....	49
6	6	2	3	3	5	5	5	8	6	3	....	1	1	....	1	....	....	49
5	15	2	5	7	6	7	4	13	6	2	2	2	2	....	....	....	....	73
4	10	4	3	8	7	3	3	5	6	1	....	....	1	....	....	....	....	51
3	13	2	3	4	3	5	2	3	3	4	....	1	....	....	1	....	....	44
2	32	16	9	2	5	2	5	2	1	....	....	1	....	....	....	....	....	75
1	24	17	2	6	2	6	3	2	3	4	1	1	....	....	....	....	....	71
0	39	8	5	1	4	7	1	2	2	1	1	....	1	....	....	....	....	72
f	163	61	49	58	75	82	85	120	103	77	54	38	29	26	13	13	2	

TABLE 45.—*Variables: Beta score, test 4 × alpha score, test 3. Group X: Special experimental group.*

ALPHA TEST 3.

BETA TEST 4	0	1	2	3	4		6	7	8	9	10	11	12	13	14	15	16	*f*
30	....	....	....	....	....	....	....	4	....	1	2	2	2	4	....	4	1	20
28–29	....	....	....	....	....	....	1	....	3	1	1	....	....	1	....	1	1	9
26–27	....	....	....	....	1	....	1	1	....	3	1	3	....	3	4	1	....	18
24–25	1	....	....	....	....	3	....	5	8	6	3	4	4	1	3	3	....	41
22–23	....	....	1	1	....	1	2	6	10	4	10	2	4	3	3	2	....	49
20–21	1	....	1	....	2	4	8	9	14	6	9	11	9	6	1	1	....	82
18–19	1	....	2	....	4	3	14	13	14	15	7	4	4	....	....	....	....	81
16–17	6	1	6	5	10	12	13	19	17	10	6	5	1	4	1	1	....	117
14–15	8	4	4	6	16	13	13	26	13	11	8	3	3	1	....	....	....	129
12–13	9	4	3	8	8	9	11	8	12	11	5	2	2	1	....	....	....	93
10–11	7	7	6	11	15	15	10	13	6	3	2	....	....	1	1	....	....	97
8– 9	17	6	5	8	4	7	5	6	3	1	....	1	....	1	....	....	....	64
6– 7	21	11	4	4	4	8	2	6	1	1	....	....	....	....	....	....	....	62
4– 5	18	11	5	5	6	4	1	1	....	....	....	....	....	....	....	....	....	51
2– 3	22	11	5	6	2	2	....	2	....	....	....	....	....	....	....	....	....	50
0– 1	52	6	7	4	3	1	4	1	2	4	....	....	....	....	....	....	....	84
f	163	61	49	58	75	82	85	120	103	77	54	37	29	26	13	13	2	

TABLE 46.—*Variables: Alpha score, test 3 × beta score, test 5. Group X: Special experimental group.*

BETA TEST 5.

ALPHA TEST 3.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	*f*
16																					1		1				2
15																		1	2	2	1	1	2	1	3		13
14	1															1				1	4	2	1	2	1		13
13													2	1	2	1	2	1		4	1	3	3	1	4	1	26
12				1								1	1	1		1	2	3	2	1	4	2	6	2	1	1	29
11									1		1			1		1	1	4	9	5	2	4	5	1	2		37
10										2		1		1	5	5	3	8	9	10	3	1	1	1	1	3	54
9							1	1		1		6	3	3	10	5	7	7	4	8	3	6	2	7	1	2	77
8	1		2		1			1	1		2	3	4	4	7	13	8	7	17	9	4	5	5	4	1	4	103
7				1	1		1	2	1	3	8	2	7	12	15	12	9	10	7	10	2	5	6	2	1	3	120
6					1			3	3	3	2	6	3	8	5	11	5	4	8	4	4	2	5	4		2	85
5	3			1		2	2	5	2	3	5	7	3	6	7	8	3	9	3	1		1	1	4	2	2	82
4	3	1	4	1		1	4	5	3	4	5	3	10	2	7	4	5	4	4	2	1	1		1			75
3	1	1	2				1	4	3	3	7	3	5	6	4	8	3	2	2	2						1	58
2	7	1	1	1			2	1	3	6	4	4	6	4	2	2			1	2			1			1	49
1	5	1	6	1	6		7	4	5	5	3	3	3	4	4	2		1							1		61
0	34	13	9	9	10	6	13	11	12	7	6	10	5	2	4	2	2	4	2		2						163
f	55	17	24	15	19	9	31	37	34	41	43	49	52	55	72	76	50	65	70	61	32	33	39	30	18	20	

TABLE 47.—*Variables: Alpha score, test 3 × beta score, test 6. Group X: Special experimental group.*

BETA TEST 6.

ALPHA TEST 3.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	*f*
16																	2					2
15										1				1	1	2	2	1	3	2		13
14												1	2	2	1	1	2	1	2		1	13
13										2				2	3	2	5		6	1	5	26
12											1	2		4	6	3	4	2	3	4		29
11										2	1	1	5	3	5	4	9	2	1	1	3	37
10						1	1				1		2	7	2	5	9	4	8	8	2	2	2	54
9										1	1	2	3	2	4	6	12	9	10	12	6	7	2		77
8											2	1	6	4	9	11	14	13	13	14	7	4	7	2	103
7						2				1	1	4	3	7	7	13	21	17	19	9	8	3	3	2	120
6										2	3	2	4	9	15	4	11	14	4	7	8	2			85
5									3	4	5	2	7	5	11	15	7	5	5	5	3	3	2		82
4		1	1							4	3	5	9	10	9	5	6	6	8	4	2	1		1	75
3									1		4	5	11	6	3	10	5	5	4	2	1			1	58
2	1								4	3	3	6	8	4	7	2	4	3	2	1	1				49
1		1	2	1	5					3	5	12	9	9	8	2	1	1	1	1					61
0	11	3	6	7	8	10	15	15	23	16	17	9	9	7	3		3	1							103
f	12	5	9	9	16	18	33	42	63	81	77	93	86	101	101	82	90	51	37	24	15	

TABLE 48.—*Variables: Beta score, test 7 × alpha score, test 3. Group X: Special experimental group.*

ALPHA TEST 3.

BETA TEST 7.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	*f*
10	2	1	2	1	7	10	6	17	11	15	9	3	4	9	3	5		105
9	2	1	1	5	3	6	10	10	18	10	8	9	9	5	3	2		102
8	6	2	1	2	8	5	6	12	8	8	6	6	2	3	1			76
7	5	4	4	7	6	6	13	14	16	8	9	7	4				2	106
6	5	5	4	9	9	10	16	14	12	10	9	1	1	5	1	2		113
5	16	2	8	9	8	17	19	17	19	12	4	6	6	1	2			137
4	12	7	8	5	12	12	6	13	9	4	4	1	1	2	1	1	1	99
3	15	8	7	2	8	2	8	11	5	2	1	3	2	1	1			76
2	17	13	5	7	3	4	4	5		5					1			64
1	28	7	6	4	3	6	4	2	2		2					1		65
0	55	11	3	7	8	4	2	5	3	3	2	1						104
f	163	61	49	58	75	82	85	120	103	77	54	37	29	26	13	13	2	

TABLE 49.—*Variables: Alpha score, test 4 × alpha score, test 5. Group X: Special experimental group.*

ALPHA TEST 5.

ALPHA TEST 4.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	*f*
40																							1			1
38–39																				1	1					2
36–37																	1									1
34–35											1															1
32–33														1				1				1	1	1		5
30–31													1		1		2	1	2			1	3	1	2	14
28–29	1										1		1	1					2		1	1	2	1	1	12
26–27												1	3		1	2	1		2	1	1	2	1			15
24–25			1							1			1	2	5	4	4	3	2	1	2		2		1	29
22–23	4								2		1	1	1	4	2	1	2	2		1	3	1				25
20–21	1			1		1			1	2	1	2	1	3	2	4	3	2	3	2	2	1			1	33
18–19			1				1		2	6	3	5	4	3	5	2	3	2	1	1	2			1		42
16–17	2	1			1	1	3	3	8	3	6	6	4	4	2	6	1	1		2						54
14–15	4				3	4	1	3	5	4	3	4	12	3	5	1	2		2		1					57
12–13	2	1	1	2	4	1	5	2	3	4	2	3	4	3	6	3	1		1				1			49
10–11	6	2	2		3	3	2	7	6	2	7	3	4	2	2	3										54
8– 9	4	2	2	4	2	2	5	2	4	5	5	5	3	2		1	1									49
6– 7	7	4	5	4	7	7	1	4	14	3	2	5	5	2		1	1				2					74
4– 5	14	3	7	4	4	3	5	3	4	6	5	1	2	1	1	1										64
2– 3	18	6	4	7	9	8	7	6	2	1	1	3		2												74
0– 1	181	27	31	25	28	21	21	12	8	6	9	10	4	2	2	2	1	1		1	1					393
f	244	46	54	46	62	50	52	42	59	43	47	49	50	35	34	31	23	13	15	10	16	7	11	4	5	

TABLE 50.—*Variables: Alpha score, test 6 × alpha score, test 4. Group X: Special experimental group.*

ALPHA TEST 4.

ALPHA TEST 6.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	*f*
20																						
19																						
18		1																				1
17							1	1	1		1										1	5
16	1											1	1							1		4
15				1			1		3	1	2		1		1							10
14		1				1			1		1			1	1	3	1					10
13						3	1		3	1	4		2	2		1	1					18
12	2		1	1	2	3	2	2	3	3	3		6	2	2	3	2					37
11	5	1	3	2	2	5		9	5	6	2	2		3	3	6	1		1	1		57
10	1		4	7	5	6	4	6	4	8	7	10	9	3	3	1						78
9	11	7	4	8	5	4	10	8	7	8	3	4	5	2	2			1				89
8	11	3	5	9	6	2	5	6	3	5	5	3	[redacted]	1								66
7	20	10	2	6	5	8	3	6	8	4	2	2	1									77
6	25	4	5	10	4	5	6	5	4		1											69
5	34	5	10	9	3	3	8	6	3	2												83
4	21	5	5	3	5	5	2	2	2	1	1											52
3	25	9	5	6	3	3	2		2		1	1	1	1								59
2	36	10	6	3	2	3		1	1			2										64
1	59	6	9	4	4		1	3	3	2												91
0	141	13	5	4	3	3	3	2	1	1			1									177
f	393	74	64	73	49	54	49	57	54	42	33	25	29	15	12	14	5	1	1	2	1	

TABLE 51.—*Variables: Alpha score, test 4 × alpha score, test 7. Group X: Special experimental group.*

ALPHA TEST 7.

ALPHA TEST 4.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	*f*
40																1						1
38–39														1		1						2
36–37							1															1
34–35																	1					1
32–33						1		1					1							1		5
30–31							2		1	2	1			2	2	1	1	1	1			14
28–29						1		4	1				1				2	1	2			12
26–27						1	3	3	2	1	1	1			1			2				15
24 25	1	1	2	1	2	1	1	2			2	3	3	1	2	5		2				29
22–23	1	1	2	2	5		3	2				4	2		1		1		1			25
20–21		1	1	2	3	6	6	1	2	1	2	4	3				1					33
18–19		6	3	7	4	3	4	4	2	2	1	1	2		1	1	1					42
16–17	5	2	6	9	8	3	4	2	2	3		5	2	2					1			54
14–15	2	5	8	10	7	5	6	1	4	2	3	1	1		1		1					57
12–13	4	5	13	5	9	4	5	1	2		1											49
10–11	5	6	6	10	6	8	4	3	2	2	1	1										54
8– 9	6	10	7	5	9	4	1	5		1					1							49
6– 7	14	15	9	7	12	4	3	6			1	1	1									73
4– 5	16	15	10	4	13	1	3								1	1						64
2– 3	23	21	12	9	4	2	1	1				1										74
0– 1	207	74	48	27	10	12	5	5	1	2			1				1					393
f	284	162	127	98	94	57	52	40	18	18	18	19	13	9	12	7	9	5	4	1		

TABLE 52.—*Variables: Alpha score, test 4 × alpha score, test 8. Group X: Special experimental group.*

ALPHA TEST 8.

ALPHA TEST 4.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	*f*
40																				1		1
38–39																		1	1			2
36–37																	1					1
34–35																			1			1
32–33														1			1	2	1			5
30–31															4	3	2	4	1			14
28–29											1			1	1	2	1	3	1	2		12
26–27												1	3	3	2	4	1			1		15
24–25										1	2	1	3	2	4	4	7	4	1			29
22–23					1		1	1	1	2	2	4	5	5	5	1	2					25
20–21				1				2	3	2	1	7	3	7	2	2	2		1			33
18–19					1		1	5	2	2	7	3	4	5	5	3	3		1			42
16–17				2	1	1	4	5	10	8	7	5	5	2	1	1			2			54
14–15					3	5	4	7	8	5	6	4	5	1	6	2		1				57
12–13			1	2	4	3	5	6	6	7	4	2	5		2	2						49
10–11			1	6	5	11	2	6	3	7	3	3	2	4	1							54
8–9	1		2	6	5	6	6	4	3	5	5	2	2	1	1							49
6–7	2	3	12	5	8	8	8	7	8	1	5	2	1		2		1					73
4–5		4	4	9	4	11	11	2	8	7	1	2	1									64
2–3	7	10	8	16	8	9	5	3	2	4		1			1							74
0–1	149	38	41	47	24	27	22	8	15	11	2	2	6	1								393
f	159	55	69	94	63	82	68	56	69	61	46	37	44	34	36	24	21	15	10	4		

TABLE 53.—*Variables: Beta score, test 1 × alpha score, test 4. Group X: Special experimental group.*

ALPHA TEST 4.

BETA TEST 1.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	*f*
10	13	2	4	5	4	6	6	6	11	6	5	7	6	2	3	6			1	1	1	95
9	24	13	6	10	6	9	9	11	11	10	11	6	4	2	2	2		1		1		138
8	63	11	17	17	10	14	14	17	12	10	4	6	11	3	4	3	2					218
7	67	9	11	15	11	11	8	9	8	5	5	1	7	4	2	1	2					176
6	34	15	6	12	4	5	5	6	4	5	5	3	1	2		2	1					130
5	42	6	7	5	3	3	3	3	7	4				1	1							85
4	49	6	3	3	4	2		2	1		2	2		1								75
3	28	7	4	1	2	3	1	1		1												48
2	26		1	3	5	1	1	2		1	1											41
1	12	4	4	1			1															22
0	15	1	1	1			1															19
f	393	74	64	73	49	54	49	57	54	42	33	25	29	15	12	14	5	1	1	2	1	

TABLE 54.—*Variables: Beta score, test 2 × alpha score, test 4. Group X: Special experimental group.*

ALPHA TEST 4.

BETA TEST 2.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40–41	*f*
16	3		1	2	2	4	1	2	4	5	4	3	1		1	1	1			1		36
15	8	2	5	4	6	1	4	3	6	7	2	2	3	4	2	3						62
14	10	2	5	5	3	6	8	7	7	5	7	7	4	2	3	5	2	1				89
13	17	3	6	9	8	6	6	9	6	6	6	4	5	6	2	4					1	104
12	23	6	3	6	8	5	4	9	5	3	4	1	3	2	1		1		1	1		86
11	24	9	5	13	3	10	7	8	6	4	5	2	1		1		1					99
10	29	7	3	8	7	4	5	5	5	3	1	2	4									83
9	31	6	5	6		3	3	2	5	3	1	1	2	1		1						70
8	27	2	8	8	3	1	2	1	3	2			4									63
7	29	6	3	3	1	5	3		3	1		1										55
6	22	3	4	1	1	2	2	2	1	1												39
5	31	8	4		2	1	2		1													49
4	27	6	4		2	1	2	4			1											47
3	27	2	2		1	2	1	1		1		1	1		1							40
2	18	2	3	4	1	1	1		1		1											32
1	31	1	3	2				1			1	1			1							41
0	36	8	1	2	1	2		1	1	1			1									54
f	393	74	64	73	49	54	49	57	54	42	33	25	29	15	12	14	5	1	1	2	1	

TABLE 55.—*Variables: Beta score, test 3 × alpha score, test 4. Group X: Special experimental group.*

ALPHA TEST 4.

BETA TEST 3.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	*f*
12	3	2	4	6	1	6	7	10	5	11	10	5	6	3	5	6	3	1	....	1	1	96
11	9	2	5	12	5	7	6	5	11	6	7	7	9	6	1	5	1	....	....	....	....	104
10	26	8	10	8	11	10	9	16	16	12	11	9	7	3	4	2	1	....	1	1	....	165
9	35	12	10	13	9	7	7	10	8	7	1	1	1	1	1	1	....	....	....	....	....	124
8	26	8	6	10	3	3	3	5	4	1	1	1	2	1	....	....	....	....	....	....	....	74
7	24	3	4	4	3	4	3	2	2	....	....	....	....	....	....	....	....	....	....	....	....	49
6	21	3	6	2	2	3	4	1	1	1	1	....	2	1	1	....	....	....	....	....	....	49
5	37	6	7	2	6	2	4	3	2	2	1	1	....	....	....	....	....	....	....	....	....	73
4	26	8	3	4	2	3	3	1	1	....	....	....	....	....	....	....	....	....	....	....	....	51
3	23	5	3	3	3	3	1	....	2	....	....	1	....	....	....	....	....	....	....	....	....	44
2	56	10	1	4	....	1	....	2	....	1	....	....	....	....	....	....	....	....	....	....	....	75
1	50	3	2	2	3	3	2	2	1	1	....	....	2	....	....	....	....	....	....	....	....	71
0	57	4	3	3	1	2	....	....	1	....	1	....	....	....	....	....	....	....	....	....	....	72
f	393	74	64	73	49	54	49	57	54	42	33	25	29	15	12	14	5	1	1	2	1	

TABLE 56.—*Variables: Beta score, test 4 × alpha score, test 4. Group X: Special experimental group.*

ALPHA TEST 4.

BETA TEST 4.	0–1	1–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	*f*
30	2	....	1	....	....	....	1	1	1	2	1	3	1	....	2	4	....	....	....	....	1	20
28–29	....	....	....	....	....	1	2	....	....	2	....	....	3	....	....	1	....	....	....	....	....	9
26–27	1	1	....	....	1	....	1	1	....	3	2	2	....	1	1	3	....	....	....	1	....	18
24–25	8	1	2	3	....	1	2	6	5	5	2	2	2	....	1	....	....	....	....	1	....	41
22–23	2	3	1	1	2	5	4	6	5	4	4	....	4	1	3	3	1	....	....	....	....	49
20–21	4	2	1	5	3	3	5	7	10	9	11	5	6	7	1	1	2	....	....	....	....	82
18–19	17	5	6	6	5	7	7	7	7	3	2	2	4	....	1	2	....	....	....	....	....	81
16–17	21	8	11	13	8	14	6	8	6	4	5	3	4	1	3	....	1	....	1	....	....	117
14–15	33	13	11	14	9	4	9	10	8	5	4	4	2	2	....	....	1	....	....	....	....	129
12–13	34	7	11	6	6	7	2	2	9	3	1	2	2	1	....	....	....	....	....	....	....	93
10–11	41	11	4	8	8	9	6	4	....	1	1	2	....	2	....	....	....	....	....	....	....	97
8–9	35	8	6	6	3	....	2	2	2	....	....	....	....	....	....	....	....	....	....	....	....	64
6–7	40	6	5	1	4	1	2	2	....	1	....	....	....	....	....	....	....	....	....	....	....	62
4–5	44	2	1	3	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	51
2–3	43	3	3	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	50
0–1	68	5	1	6	....	1	....	1	1	....	....	....	1	....	....	....	....	....	....	....	....	84
f	393	75	64	73	49	54	49	57	54	42	33	25	29	15	12	14	5	0	1	2	1	

TABLE 57.—*Variables: Alpha score, test 4 × beta score, test 5. Group X: Special experimental group.*

BETA TEST 5.

ALPHA TEST 4.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	*f*
40	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1
38–39	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	....	....	2
36–37	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	1
34–35	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1
32–33	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	1	1	....	....	1	....	....	....	5
30–31	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	2	3	3	....	....	2	1	14
28–29	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	3	2	1	2	1	2	....	....	12
26–27	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	2	1	2	2	2	1	....	1	1	2	15
24–25	....	....	....	....	....	....	....	....	1	....	....	1	....	....	1	2	2	3	5	3	2	2	3	1	1	2	29
22–23	1	....	....	....	....	....	....	1	....	....	....	....	1	2	....	3	2	3	2	2	....	1	2	3	1	1	25
20–21	....	....	....	....	....	....	....	....	1	....	1	....	2	....	2	3	1	....	3	7	4	2	4	1	2	....	33
18–19	....	....	1	....	....	....	....	....	....	....	....	1	....	1	3	2	3	9	3	2	4	3	4	2	....	3	42
16–17	....	....	....	....	....	....	....	1	....	2	....	3	2	4	5	2	3	7	6	6	2	2	4	....	1	4	54
14–15	....	....	2	....	1	....	....	....	....	1	3	2	4	6	5	5	4	3	4	3	3	....	1	5	3	2	57
12–13	....	....	....	....	1	....	....	2	1	1	1	2	1	2	5	6	....	4	6	4	3	4	4	2	....	....	49
10–11	....	....	1	....	....	....	2	1	....	2	....	5	1	3	9	3	4	3	8	3	3	2	2	1	1	....	54
8–9	1	....	....	....	....	1	....	....	1	....	3	3	1	1	2	9	5	1	5	8	1	2	....	2	1	2	49
6–7	1	1	....	....	....	1	2	1	3	4	6	1	3	7	3	5	2	8	7	4	1	1	4	5	2	1	73
4–5	1	....	3	1	1	....	2	....	3	5	1	3	8	3	3	5	8	7	2	2	1	3	1	1	....	....	64
2–3	5	1	1	....	1	....	1	5	1	6	3	4	11	4	9	5	4	3	1	4	....	1	1	2	....	1	74
0–1	46	15	17	13	15	7	24	26	23	20	24	24	18	22	24	23	10	11	12	6	2	2	4	2	2	1	393
f	55	17	24	15	19	9	31	37	34	41	43	49	52	55	72	76	50	65	70	61	32	33	39	30	18	20	

TABLE 58.—*Variables: Alpha score, test 4 × beta score, test 6. Group X: Special experimental group.*

BETA TEST 6.

ALPHA TEST 4.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	f
40																					1	1
38–39														1					1			2
36–37															1							1
34–35																				1		1
32–33														1		1	1	1		1		5
30–31															1	3	1	3	2		4	14
28–29										1			2	2	1		2	1	1	1	1	12
26–27											1		2		3	2	1		4	1	1	15
24–25								1				1	2	3	5	4	5	3	2	2	1	29
22–23										2			2	4	4	1	3	1	5	1		23
20–21										1			2	7	4	4	6	2	4	1	2	33
18–19										1	4	2	1	3	7	8	7	5	3	1		42
16–17				1					2	2	1	3	5	5	7	6	9	9	2	2		54
14–15									2	2	5	6	6	6	11	7	8	2	3	2		57
12–13									1	3	3	7	5	6	7	9	6	2	2	2		49
10–11		1			1			1	3	1	7	5	11	2	9	7		3	4	1		54
8– 9						1			3	2	4	6	7	7	4	5	4	3		1	2	49
6– 7					1	1	3	1	5	9	7	6	6	10	7	8	5		2	2		73
4– 5			1		2		1	4	3	6	6	7	4	4	9	5	6	2	2	1	1	64
2– 3					2		3	4	7	10	6	12	9	5	3	3	4	3	1			74
0– 1	12	4	8	8	11	17	27	29	43	43	39	35	28	30	22	15	10	7	3	1	1	393
f	12	5	9	9	16	18	33	42	[illegible]	81	77	93	86	101	101	82	90	51	37	24	17	

TABLE 59.—*Variables: Beta score, test 7 × alpha score, test 4. Group X: Special experimental group.*

ALPHA TEST 4.

BETA TEST 7.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	f
10	8	3	7	7	6	6	6	10	10	8	5	4	9	3	3	5	2			2	1	105
9	13	6	6	10	3	7	6	6	6	9	7	4	4	5	2	5	2	1				102
8	13	8	6	8	3	3	6	3	9	4	6	2	2	1			1	1				76
7	27	5	5	9	11	6	6	6	8	5	4	4	4	2	2	2						106
6	37	8	12	6	7	6	8	11	5	3	2	3	4		1							113
5	45	9	6	13	7	8	7	13	9	4	4	4	1	3	2	2						137
4	41	11	4	6	3	12	5	6	2	5	1	1	1		1							99
3	38	6	6	7	2	2	3	1	3	2	3		3									76
2	44	6	4	3	2	1			1	1		2										64
1	46	4	5	2	2	1	1		1	1			1		1							65
0	81	8	3	2	3	2	1	1			1	1		1								104
f	393	74	64	73	49	54	49	57	54	42	33	25	29	15	12	11	5	1	1	2	1	

TABLE 60.—*Variables: Alpha score, test 5 × alpha score, test 6. Group X: Special experimental group.*

ALPHA TEST 6.

ALPHA TEST 5.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	f
24									1		1	1			1	1						5
23											1	1	1		1							4
22				1			1			1		1	3	1	1	1		1				11
21	1									1	1		2	2								7
20							1	2		1	4	1	3	1		1	1					15
19	1								1	4	1	2	1									10
18							1		2	1	2	2	2	3	1			1				15
17		1							1	2	3	3	1	1		1						13
16						2	1	1	2	2	4	6	2				2	1				23
15	1	1		1	1		3	7	3	4	4	1	2	2	3	3						30
14	1		1		1	2	3	4	4	6	7	2	3		1							35
13		2		4	2		1	4	2	5	9	2	1	1	1			1				35
12	1	2		1	2	4	5	3	2	10	5	11	3	1								50
11	2	3		3	3	3	4	7	5	7	5	2	1	2	1			1				49
10	3	5	4	1		3	2	5	4	5	5	5	4	1								47
9	2	4	1		2	3	2	4	6	7	5	2	3	2								43
8	4	1	1	4	1	7	6	7	7	8	3	5				2						59
7	3	2	5	2	3	8	3	4	1	3	2	4	2			1	1					42
6	4	7	4	6	2	4	6	5	3	6	3	2										52
5	5	3	8	3	1	11	7	2	4	2	3	1										50
4	7	7	6	3	9	8	3	5	4	3	3	2	1	1								62
3	10	7	7	5	3	3	1	5	1	3			1									46
2	16	11	5	6	2	1	3	3	2	1	1											54
1	6	4	3	5	8	5	6	3	2	2	2											46
0	110	31	18	14	12	18	10	12	9	5	4	1	1					1				244
f	177	91	64	59	52	83	69	77	66	89	78	57	37	18	10	10	4	5	1			

TABLE 61.—*Variables: Alpha score, test 7 × alpha score, test 5. Group X: Special experimental group.*

ALPHA TEST 5.

ALPHA TEST 7.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	*f*
40																											
38–39																							1				1
36–37																					1		1	1	1		4
34–35																			2		1	2					5
32–33	1				1			1			2			1					1		1		1				9
30–31																1	1	1			2		2				7
28–29		1											2				4	2	1		1		1				12
26–27									1								1		1	1	1	1	1	1	1		9
24–25	1												1	1	1	3	1		1		2		1	1			13
22–23	1						1			1	1	2	3	2	1			3	1	2	1						19
20–21	1							1	2		1		3		3	1		2	2						2		18
18–19								1	2	2		2	3	3			2	1	1	1							18
16–17	1	1			1				1	1	3	1	2		1	3			2				1				18
14–15	2					1	2	1	2		5	3	3	1	3	7	2	1		1	2	1	1	1	1		40
12–13	1	3	1	1	1	3	3	4	5	4	1	1	3	3	4	1	5	1	2	3		2					52
10–11	7		1		2	6	2	4	8	4	2	6	1	5	3	2	3	1									57
8– 9	11	5	2	5	4	7	1	3	7	6	9	9	3	6	5	5			1	2	1	1	1				94
6– 7	11	2	4	4	6	7	5	6	5	5	10	5	10	5	8	3	2										98
4– 5	27	6	9	3	11	4	10	6	12	7	6	6	7	2	5	2	1	1			2						127
2– 3	38	9	15	11	19	11	19	8	6	7	3	4	5	5		2											162
0– 1	142	19	22	22	17	11	9	7	8	6	4	10	4	1		1	1										284
f	244	46	54	46	62	50	52	42	59	43	47	49	50	35	34	31	23	13	15	10	15	7	11	4	5		

TABLE 62.—*Variables: Alpha score, test 8 × alpha score, test 5. Group X: Special experimental group.*

ALPHA TEST 5.

ALPHA TEST 8.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	*f*
40																											
38–39																1						1	1		1		4
36–37											1				1				1	3	1	1	1		1		10
34–35															1		1	1	2		2	1	4	1	2		15
32–33						1			1	1		1	1		1	1	4	1	3		2	2	1	1			21
30–31			1						2		2	2	1		3	3	2	2	2		1		1	1	1		24
28–29	3					1			1	1	1	1	5	2	3	3	4	3	2	3		1	2				36
26–27	2						1		1	1	1	2	2	5	2	2	4	1	4	1	4	1					34
24–25	4	1	1	1	1				1	3	2	4	6	5	8	2	2				1		1	1			44
22–23					2	1	2	2	3	1	3	5	3	3	1	5	1	2	1	1	1						37
20–21	1	1	2	3	1	3	2	1	3		2	4	5	6	3	4	1	1		1	2						46
18–19	6	1	1	1	2	3	3	3	6	4	8	7	4	2	4	3	2	1									61
16–17	7	2	2		2	6	2	5	9	4	6	4	7	6	4	2				1							69
14–15	7	1	2	2	1	1	2	3	4	5	5	5	6	4	2	4	1	1									56
12–13	11	3	2	2	6	2	10	4	4	6	6	3	5	1		1	1				1						68
10–11	14	3	10	3	10	5	3	8	5	8	4	4	4	1													82
8– 9	11	5	5	1	4	8	8	5	8	3	1	4															63
6– 7	24	8	5	7	14	5	13	6	3	3	3	2			1												94
4– 5	23	5	5	7	8	3	6	5	4	1	1	1															69
2– 3	21	5	10	9	3	4			1	1	1																55
0– 1	110	11	8	10	8	7	1		2	1			1														159
f	244	46	54	46	62	50	53	42	58	43	47	49	50	35	34	31	23	13	15	10	15	7	11	4	5		

TABLE 63.—*Variables: Beta score, test 1 × alpha score, test 5. Group X: Special experimental group.*

ALPHA TEST 5.

BETA TEST 1.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	*f*
10	9	3	2		3	5	1	4	7	3	2	7	5	5	7	5	3	3	5		5	1	6	2	2	95
9	14	3	4	5	7	3	10	4	10	9	7	5	12	8	7	8	5	2	5	2	4	1	2	1		138
8	39	9	14	11	9	10	10	10	14	9	14	17	9	8	7	7	5	2	2	2	3	2	3		2	218
7	40	9	7	8	10	9	11	7	6	10	9	10	9	3	7	3	3	5	3	2	2	2		1		176
6	33	8	9	7	7	8	5	6	6	6	4	6	4	6	1	4	4	1		2	1	1			1	130
5	24	3	5	4	6	9	5	1	7	3	3	1	2	4	3	2	2			1						85
4	30	5	6	4	8	1	3	5	1	1	4	1	1	1		2	1			1						75
3	24	2			6	2	1	2	2	2	3	1	3													48
2	11	2	5	3	4	1	3	2	3		1	1	4			1										41
1	9	1	2	2	2	2		1	1				1			1										22
0	11	1		2			3		2																	19
f	244	46	54	46	62	50	52	42	59	43	47	49	50	35	34	31	23	13	15	10	15	7	11	4	5	

TABLE 64.—*Variables: Alpha score, test 2 × alpha score, test 5. Group X: Special experimental group.*

ALPHA TEST 5.

BETA TEST 2.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	f
16	1	...	...	...	1		...	2	3	2	1	2	5	2	1	3	1	1	3	5	...	...	2	1	...	36
15	5	2	1	2	2	1	2	...	3	5	6	8	2	3	1	3	2	2	3	1	3	1	1	2	1	62
14	7	2	2	2	1	2	1	6	4	2	8	6	8	7	4	5	5	5	4	...	3	1	2	...	2	89
13	11	...	4	3	2	4	9	4	4	5	8	5	8	7	6	6	2	2	2	...	2	4	5	...	1	104
12	18	3	3	2	3	6	5	3	10	5	5	8	4	2	2	2	2	...	1	...	2	1	1	1	...	89
11	12	5	4	1	8	8	6	4	9	7	3	4	7	8	7	5	1	2	...	...	1	1	...	...	...	99
10	20	2	3	3	7	6	5	4	3	5	3	5	4	2	2	1	3	...	1	1	3	...	...	...	...	83
9	17	2	2	3	5	7	3	2	3	5	3	4	2	2	3	2	5	1	...	1	...	...	...	...	...	70
8	13	1	9	3	6	4	4	4	5	2	1	2	1	2	1	1	1	...	...	1	...	...	...	...	...	61
7	20	4	2	5	4	1	1	3	2	1	...	1	4	1	3	1	...	...	...	1	1	...	...	...	...	55
6	14	3	5	2	2	1	4	1	2	1	1	1	1	...	...	1	...	...	...	...	...	...	...	...	...	39
5	21	4	5	2	2	1	4	4	2	1	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	49
4	17	4	4	4	4	2	2	1	...	1	2	1	1	...	2	...	3	...	...	...	...	...	...	...	...	47
3	14	3	1	3	6	3	2	1	3	...	1	...	...	1	1	...	...	...	1	...	...	...	...	...	...	40
2	13	2	3	5	4	1	1	...	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	32
1	22	2	2	3	2	1	1	1	2	1	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	41
0	22	7	5	3	3	2	3	2	3	...	2	1	...	...	1	...	...	...	...	...	...	...	...	...	...	54
f	244	46	54	46	62	50	52	42	59	43	47	49	50	35	34	31	23	13	15	10	15	7	11	4	5	

TABLE 65.—*Variables: Beta score, test 3 × alpha score, test 5. Group X: Special experimental group.*

ALPHA TEST 5.

BETA TEST 3.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	f
12	7		1	...	2	2	3	4	4	7	2	5	9	3	6	4	7	4	6	1	7	1	6	2	2	96
11	2	1	3	...	1	2	5	3	9	6	4	8	11	9	9	8	5	2	4	3	2	3	1	...	3	104
10	14	6	2	2	5	6	11	7	12	9	14	14	10	10	8	9	6	6	3	3	3	2	3	...	...	165
9	24	7	8	4	10	8	10	6	6	6	8	7	4	1	2	3	4	1	2	2	1	...	...	...	...	124
8	14	5	4	5	7	6	...	4	10	2	2	2	3	1	3	3	1	...	...	...	...	1	1	...	...	74
7	15	4	4	6	3	5	2	...	...	2	2	1	1	4	...	...	...	...	...	...	...	...	...	...	...	49
6	10	3	4	5	3	1	2	3	2	...	2	5	3	1	1	1	...	...	...	1	1	...	...	1	...	49
5	20	4	5	4	3	7	5	3	3	4	3	2	5	2	1	1	...	...	...	...	1	...	...	...	...	73
4	14	3	2	5	7	3	4	3	4	2	1	1	...	1	...	1	...	...	...	...	...	...	...	...	...	51
3	14	3	2	5	6	...	2	2	3	1	1	1	2	2	...	...	...	...	...	...	...	...	...	...	...	44
2	35	5	8	7	4	4	3	2	2	1	1	2	1	...	...	...	...	...	...	...	...	...	...	...	...	75
1	31	5	8	2	3	5	3	2	1	3	3	1	...	1	3	...	...	...	...	...	...	...	...	...	...	71
0	44	...	3	1	8	1	2	3	3	...	4	...	1	...	1	1	...	...	...	...	...	...	...	...	...	72
f	244	46	54	46	62	50	52	42	59	43	47	49	50	35	34	31	23	13	15	10	15	7	11	4	5	

TABLE 66.—*Variables: Beta score, test 4 × alpha score, test 5. Group X: Special experimental group.*

ALPHA TEST 5.

BETA TEST 4.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	f
30	2	...	...	...	1	...	1	2	...	1	...	...	1	...	...	1	2	...	2	1	2	...	3	...	1	20
28–29		...	...	...	...	...	...	...	...	1	...	...	1	1	1	3	...	...	...	...	1	...	1	...	...	9
26–27	1	1	...	...	...	...	...	...	...	...	...	1	2	1	1	2	...	1	2	...	3	...	2	...	1	18
24–25	4	...	1	...	...	1	1	1	5	2	5	4	3	2	...	...	2	1	4	2	1	1	...	...	1	41
22–23	1	3	1	...	...	4	2	2	2	1	2	2	4	5	4	...	5	...	3	1	...	3	1	2	1	49
20–21	5			...	1	1	6	2	6	5	2	6	6	9	7	10	3	5	1	2	...	1	2	2	...	82
18–19	14	4	4	2	6	5	1	2	9	1	6	6	4	1	6	2	4	2	...	...	2	...	...	...	...	81
16–17	19	5	8	3	3	7	1	8	14	4	6	5	10	6	6	6	3	2	2	...	6	...	1	...	1	117
14–15	19	4	5	6	11	11	11	6	7	9	6	8	7	6	3	3	...	2	1	3	...	...	1	...	...	129
12–13	19	3	3	5	7	6	8	2	3	7	9	9	1	1	2	2	2	...	...	1	...	2	...	...	...	93
10–11	20	4	7	11	13	2	5	5	5	4	5	4	6	1	2	2	1	...	...	...	...	...	...	...	...	97
8– 9	27	4	3	8	5	3		2	4	1	3	2	2	...	...	...	...	...	...	...	...	...	...	...	...	64
6– 7	21	5	7	4	5	1	4	6	1	3	1	2	...	1	1	...	...	...	...	...	...	...	...	...	...	62
4– 5	27	3	4	4	6	3	1	1	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	51
2– 3	29	3	8	2	3	3	2	8	1	4	6	5	10	6	6	6	3	2	2	...	6	...	1	...	1	117
0– 1	45	7	8	1	1	3	8	3	2	2	...	...	2	...	1	...	1	...	...	...	...	...	...	...	...	84
f	244	46	54	46	62	50	51	43	59	43	47	49	50	35	34	31	23	13	15	10	15	7	11	4	5	

TABLE 67.—*Variables: Alpha score, test 5 × beta score, test 5. Group X: Special experimental group.*

BETA TEST 5.

ALPHA TEST 5.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	*f*
24																1						2	1		1		5
23																				1	1	1				1	4
22															1		1	1	2		1		2		2	1	11
21														1						1	1		2	2			7
20				1												1		4	1		1	2	3		1	1	15
19												1			1	1		1	1			1	2	1		1	10
18															1				2	3	4		2	1		2	15
17											1				1	2		1	2	2			1		1	2	13
16							1				1		1		1	3	2		1	4	3	3	1	1		1	23
15										1		1		1	1	4	2	1	5	4	2	3	1	4	1		31
14					1			1			1		1	2	1	4	2	6	5	4	1	2		2	1		34
13									4			1	2	1	3	6	2	4	1	2	3	2	3	1	2	2	35
12				1					1		2	3	1	2	4	1	3	5	7	8	1	3	1	3	2	2	50
11	1		1						1	1	1	3	1	7	6	3	2	5	3	1	1	1	4	3	2	2	49
10	1				1			1		3		2	4	3	3	4	6	3	7	4	1	2	1	1			47
9		1		1			1	4	2			3	1	2	1	4	4	2	4	4	1	2	3		1	2	43
8	2						3	1	1	3		1	4	5	5	2	4	5	8	7	3		2	2	1		59
7	2					1			2	4	1	4	4	3	5	4	1	2	3	1	2		3	2		1	42
6	1		1	1	1	2	2	1	2	2	3	4	1	4	4	4	5	4	4	5	1	2					52
5	1						1	2	1	1	3	1	3	5	5	7	3	8	3	2	1		1	2	1		50
4	4		1			1	2	3	2	2	8	6	5	8	5	7		1	2	2		1	1			1	62
3	1		1	1		1	1	2	5	5	7	4	5	1	1	5	1	1		1			2		1		46
2	1	3	3		1		2	2	4	5	1	7	3	3	5	2	3	2	2	1		2		1	1		54
1	4	1	2	1	4		5	1	3	3		1	1	1	5	2	2	3			2	1		1		1	46
0	37	12	15	9	11	4	15	21	10	11	12	11	12	9	13	9	7	7	4	4	2	3	3	3			244
f	55	17	24	15	19	9	31	37	34	41	43	49	52	55	72	76	50	65	70	61	32	33	39	30	18	20	

TABLE 68.—*Variables: Beta score, test 6 × alpha score, test 5. Group X: Special experimental group.*

ALPHA TEST 5.

BETA TEST 6.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	*f*
20				1			1		1			2	2			1	1	1			3		3		1		17
19	4				1		1	1		2	1	2	2	1	2	2	1	1	2	1							24
18	1	1	1		1	1		1	2	2	1	2	3	1	3	4	1	2	1	2	2	2	2		1		37
17	4	1		2	1	3	4	1	5	2	3	3	4	4	3	2	3	1	2	1			1		1		51
16	10	3	6	1	2	1	2	2	11		5	5	8	6	3	5	4	3	3	1	4	1	2	1	1		90
15	6	4	1	3	6	3	5	5	6	4	4	8	4	6	3	4	3	1	3	1	2						82
14	16	1	5	5	3	7	3	6	4	6	5	6	6	6	5	4	4	3	2		2	1		1			101
13	15	4	5	4	8	5	6	6	2	8	4	8	2	3	7	3	2	1	1	3			2	2			101
12	14	4	4	3	4	11	3	4	4	8	6	5	6	2	3	1	1					2			1		86
11	19	2	7	6	8	3	10	1	5	4	7	3	6	2	4	2	2		1		1						93
10	20	5	5	5	8	5	4		6	4	4	2	3	3	1	2											77
9	26	7	4	6	7	2	7	7	3		5	2	1			1	1					1	1				81
8	22	2	5	6	8	3	2	3	6	2		1	1	1							1						63
7	21	5	2		2	2	3	1	3	1	1									1							42
6	15	1	4	2	2	2	1	4			1		1											2			33
5	12	1	1	2		1							1														18
4	12	1	1			1			1																		16
3	7	1	1																								9
2	6	2	1																								9
1	3	1			1																						5
0	11		1																								12
f	244	46	54	46	62	50	52	42	59	43	47	49	50	35	34	31	23	13	15	10	15	7	11	4	5		

TABLE 69.—*Variables: Beta score, test 7 × alpha score, test 5. Group X: Special experimental group.*

ALPHA TEST 5.

BETA TEST 7.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	*f*
10	5		2	2	7	3	5	5	6	5	5	7	7	6	4	7	4	1	5	3	6	3	3	2	2	105
9	10	2	1	2	3	1	8	3	7	5	5	6	8	8	7	2	5	3	4	2	2	2	3	1	2	102
8	9	1	4	7	1	4	2	3	4	2	8	3	8	6	2	6	2	1	1				2			76
7	15	2	3	3	4	5	6	5	9	4	3	11	7	3	4	6	4	2	3	3	1	1	1	1		106
6	25	7	7	2	4	5	7	5	6	7	7	7	7	3	3	2	2	4			3					113
5	28	10	6	5	15	7	4	4	10	6	5	4	5	6	9	3	4	2	1		2	1				137
4	25	6	4	10	6	7	7	5	4	4	6	4	5		1	2				2			1			99
3	27	2	6	5	7	5	1	3	4	3	2	2	2	2	1	2	2									76
2	23	6	4	3	9	4	3	1	2	1	3	2			1							1			1	64
1	27	3	6	2	5	4	6	2	2	4	1	1			1									1		65
0	50	7	11	5	1	5	3	6	5	2	2	2	1	1	1	1			1							104
f	244	46	54	46	62	50	52	42	59	43	47	49	50	35	34	31	23	13	15	10	15	7	11	4	5	

TABLE 70.—*Variables: Alpha score, test 6 × alpha score, test 7. Group X: Special experimental group.*

ALPHA TEST 7.

ALPHA TEST 6.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–40	*f*
20																					
19																					
18										1											1
17							1			1		2				1					5
16							1							1	1	1					4
15							1		2	1	2		1		1	1			1		10
14			1	2	1		1	2					1	1				1			10
13					3	1	1	1	2	2	1	2	3				1	1			18
12		2		2	4	3	3	4	3		1	3		3	3		3		2	1	37
11	3	3	1	5	4	6	6	5	3	3	3	3	2	3	2	1	2	2			57
10	3	8	6	9	10	8	4	8	2	4	3	4		1	2	2	2	1	1		78
9	3	11	14	10	13	10	5	8	2	3	2	2	3		2		1				89
8	6	8	11	10	9	5	9			1	4	2				1					66
7	14	14	11	13	6	6	6	3			2		2								77
6	14	12	10	8	10	1	4	3	2			1	1								69
5	24	16	16	7	11	2	3	2	1						1						88
4	12	11	7	8	3	5	2	1		1											52
3	19	12	12	9	3		1	2	1												59
2	27	13	8	6	7	3															64
1	42	23	16	5		1	3	1													91
0	117	29	14	4	8	3	1			1											177
f	284	162	127	98	94	57	52	40	18	18	18	19	13	9	12	7	9	5	4	1	

TABLE 71.—*Variables: Alpha score, test 6 × alpha score, test 8. Group X: Special experimental group.*

ALPHA TEST 8.

ALPHA TEST 6.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	*f*
20																						
19																						
18												1										1
17										2		1	1						1			5
16										1				2				1				4
15									2	1		2		1	1		1		2			10
14										2			1	1	1	1	2	1	1			10
13						1		1	1	2	1	3		2	1	2		3		1		18
12					1	1	2	1		2	3	7	1	3	4	2	5	3	2			37
11					2	1	1	6	9	4	2	2	4	5	6	4	4	3	1			57
10			1	3	3	4	5	10	5		10	4	8	2	10	5	5	2	1			78
9	1	2	2	9	3	5	6	9	8	6	11	3	7	4	5	2	3	1	1	1		89
8	1		2	4	5	8	8	1	7	8	2	3	7	3	1	3	1		2			66
7	3	4	9	4	2	7	5	9	6	6	5	2	7	7		1						77
6	2	5	3	10	1	9	7	4	8	5	5	1	1	2	3	2		1				69
5	6	5	11	11	10	13	5	5	7	4		3	3									83
4	1	1	8	11	8	5	5	1	3	5	2	2										52
3	6	6	6	9	9	3	6	3	2	3	1	1	1	1		2						59
2	14	7	9	8	6	3	5	3	2	3	1	1		1	1							64
1	22	7	10	13	5	15	4	2	3	3	2	1	2		2							91
0	103	18	8	12	8	7	6	1	6	4	1		1		1				1			177
f	159	55	69	91	63	82	68	56	69	61	46	37	44	34	36	24	21	15	10	4		

TABLE 72.—*Variables: Beta score, test 1 × alpha score, test 6. Group X: Special experimental group.*

ALPHA TEST 6.

BETA TEST 1.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	*f*
10	2	2		1	2	6	7	5	11	10	18	10	6	5	2	3	2	3				95
9	7	3	3	3	1	7	11	15	11	21	19	12	9	7	1	2						138
8	21	15	14	13	14	21	13	15	16	26	11	17	10	2	1	4	1	1				218
7	22	16	12	12	10	20	13	13	11	13	12	8	6	1	3		1					176
6	22	17	8	5	9	9	10	15	8	10	8	3	3		2				1			130
5	25	9	10	8	4	5	6	4	3	3	4	2	1			1						85
4	25	13	7	5	3	5	1	5	2	1	3	2	1		1			1				75
3	15	6	4	4	4	2	4	2	2		1	3	1									48
2	15	6	4	3		3	3	2	2	1	2											41
1	9	4	1	2	1	3	1	1														22
0	11		1	3	1	2				1												19
f	177	91	64	59	52	83	69	77	66	89	78	57	37	18	10	10	4	5	1			

TABLE 73.—*Variables: Beta score, test 2 × alpha score, test 6. Group X: Special experimental group.*

ALPHA TEST 6.

BETA TEST 2.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	*f*
16	1	....	....	....	....	....	....	1	3	7	5	5	7	2	1	3	1	....	....	....	....	36
15	....	2	....	1	....	1	....	5	8	11	8	7	8	6	2	....	....	3	....	....	....	62
14	5	2	2	2	....	2	3	9	8	10	16	10	8	4	3	4	1	....	....	....	....	89
13	3	6	3	3	5	9	6	11	8	12	16	10	4	3	2	1	....	1	1	....	....	104
12	....	7	3	2	3	10	8	8	10	16	5	5	3	1	2	1	1	1	....	....	....	86
11	11	7	1	4	7	11	11	16	6	11	8	5	1	....	....	....	....	....	....	....	....	99
10	6	7	9	6	7	11	6	4	8	7	6	4	1	....	....	....	1	....	....	....	....	83
9	9	9	8	5	4	9	8	3	2	2	6	3	1	1	....	....	....	....	....	....	....	70
8	9	10	5	7	4	5	6	3	5	3	....	3	1	....	....	....	....	....	....	....	....	61
7	13	3	6	6	5	6	4	3	2	3	....	1	2	....	....	1	....	....	....	....	....	55
6	11	6	4	4	1	3	2	3	1	3	1	....	....	....	....	....	....	....	....	....	....	39
5	18	8	5	7	2	5	2	1	....	....	....	1	....	....	....	....	....	....	....	....	....	49
4	15	6	2	2	4	4	3	3	....	3	3	2	....	....	....	....	....	....	....	....	....	47
3	15	6	4	1	1	4	2	2	2	1	1	....	....	1	....	....	....	....	....	....	....	40
2	12	5	3	1	3	....	2	3	2	....	1	....	....	....	....	....	....	....	....	....	....	32
1	17	4	6	4	3	2	3	....	....	....	2	....	....	....	....	....	....	....	....	....	....	41
0	32	3	3	4	3	1	3	2	1	....	....	1	1	....	....	....	....	....	....	....	....	54
f	177	91	64	59	52	83	69	77	66	89	78	57	37	18	10	10	4	5	1	....	....	

TABLE 74.—*Variables: Beta score, test 3 × alpha score, test 6. Group X: Special experimental group*

ALPHA TEST 6.

BETA TEST 3.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	*f*
12	....	1	....	2	2	4	1	5	12	7	12	11	15	7	6	5	2	4	....	....	....	96
11	....	2	....	3	1	3	2	7	11	20	22	12	7	5	2	4	2	....	1	....	....	104
10	4	3	4	1	8	12	15	19	13	30	21	23	8	2	1	....	....	1	....	....	....	165
9	10	6	3	10	10	15	16	11	13	15	8	2	2	1	1	1	....	....	....	....	....	124
8	4	8	6	8	3	8	10	13	6	2	3	1	....	2	....	....	....	....	....	....	....	74
7	9	4	5	2	4	5	3	8	2	3	3	....	1	....	....	....	....	....	....	....	....	49
6	6	9	3	6	4	4	4	1	1	6	2	3	....	....	....	....	....	....	....	....	....	49
5	15	11	8	6	7	7	6	1	1	4	4	1	2	....	....	....	....	....	....	....	....	73
4	8	8	6	6	3	8	4	3	1	....	1	3	....	....	....	....	....	....	....	....	....	51
3	14	7	4	5	4	1	2	1	4	1	1	....	....	....	....	....	....	....	....	....	....	44
2	32	11	5	7	2	9	3	4	1	1	....	....	....	....	....	....	....	....	....	....	....	75
1	34	13	9	2	2	4	2	3	....	....	....	1	1	....	....	....	....	....	....	....	....	71
0	41	8	11	1	2	3	1	1	1	....	1	....	1	1	....	....	....	....	....	....	....	72
f	177	91	64	59	52	83	69	77	66	89	78	57	37	18	10	10	4	5	1	....	....	

TABLE 75.—*Variables: Beta score, test 4 × alpha score, test 6. Group X: Special experimental group.*

ALPHA TEST 6.

BETA TEST 4.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	*f*
30	1	....	....	....	1	....	....	1	2	1	4	4	2	1	2	....	....	1	....	....	....	20
28–29	....	1	....	....	1	....	1	1	1	....	1	....	2	....	....	1	....	....	....	....	....	9
26–27	....	....	....	....	1	....	2	1	1	2	2	1	1	3	2	1	1	....	....	....	....	18
24–25	....	1	....	....	....	2	3	1	6	5	8	6	6	....	....	....	....	3	....	....	....	41
22–23	....	4	....	1	2	1	5	....	5	8	5	10	5	2	....	....	1	....	....	....	....	49
20–21	2	1	....	....	3	3	2	9	5	16	14	5	6	6	2	6	....	1	1	....	....	82
18–19	5	4	3	4	2	8	7	8	7	12	8	7	4	1	....	....	1	....	....	....	....	81
16–17	10	2	3	9	7	16	10	10	5	7	14	12	5	2	2	2	1	....	....	....	....	117
14–15	10	10	8	16	5	10	11	11	12	17	8	7	2	2	....	....	....	....	....	....	....	129
12–13	6	11	6	5	3	8	8	10	10	7	10	4	3	1	1	....	....	....	....	....	....	93
10–11	12	12	7	7	10	12	8	12	5	7	3	1	....	....	1	....	....	....	....	....	....	97
8– 9	15	5	7	2	8	10	6	5	5	1	....	....	....	....	....	....	....	....	....	....	....	64
6– 7	19	12	9	5	3	6	....	4	....	3	1	....	....	....	....	....	....	....	....	....	....	62
4– 5	26	5	8	....	4	3	3	1	1	....	....	....	....	....	....	....	....	....	....	....	....	51
2– 3	24	9	5	5	1	2	1	3	....	....	....	....	....	....	....	....	....	....	....	....	....	50
0– 1	47	14	8	5	1	2	2	....	1	3	....	....	1	....	....	....	....	....	....	....	....	84
f	177	91	64	59	52	83	69	77	66	89	78	57	37	18	10	10	4	5	1	....	....	

Table 76.—*Variables: Alpha score, test 6 × beta score, test 5. Group X: Special experimentol group.*

BETA TEST 5.

ALPHA TEST 6.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	f
20																											
19																											
18																									1		1
17																				1		1	1	1	1		5
16																				1		1	1		1		4
15													1							1		2	3		2	1	10
14																	1	1		5			1		2		10
13														1	1		2		3	2	4	1	1	2		1	18
12											1		1		1	4	1	2	7	3	4	4	4	1	2	2	37
11							1				1	1	1	2	2	7	4	5	6	10	2	3	3	3	1	5	57
10			1						2			3			5	7	2	13	12	7	1	8	7	3	2	2	78
9			1	1		2			1	2	2	1	2	5	7	7	1	9	12	11	3	3	6	4		5	89
8							1		2	2	1	1	3	1	6	9	7	3	4	3	9	4	3	3		1	66
7	3					2		2		3	6	3	1	8	8	4	4	7	5	5		1	1	5	3		74
6					1		1	2	2	3	4	3	3	8	5	6	8	5	3	2	6	1	4	1	1		69
5	2		1		2	2	3	4	4	3	5	4	6	9	10	11	2	2	3	5		2	1		2	3	86
4	1		2	1	2		1	3	1	[redacted]		6	5	3	4	7	2	2	1	3				2			52
3	2		1		2	1	5	3	1	3		5	4	5	5	3	4	6	2	2	1	1	1	2			59
2	8		2		2		1	9	6	4	9	1	4	2	4	2	2	4	3					1			64
1	7	1	3	5	1	3	6	4	6	6	5	8	6	2	8	4	3	3	5		1	1	2	1			91
0	32	16	13	8	9	2	10	9	9	9	9	13	8	6	6	5	4	3	4		1			1			177
f	55	17	24	15	19	9	31	37	34	41	43	49	52	55	72	76	50	65	70	61	32	33	39	30	18	20	

Table 77.—*Variables: Alpha score, test 6 × beta score, test 6. Group X: Special experimental group.*

BETA TEST 6.

ALPHA TEST 6.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	f
20																						
19																						
18																	1					1
17														1			2	1			1	5
16															1		1	1	1			4
15												1		1	3		3	1	1			10
14														1	1		1	3	1	2	1	10
13												1	3	2	1	2	2		2	3	2	18
12										1	1		2	4	1	2	6	11	3	2	2	37
11								1			1	1	1	4	8	12	6	5	5	5	3	57
10				1	1				1		2	4	5	4	13	10	10	10	5	7	2	3	78
9									2	1	6	4	6	4	9	15	10	11	11	6	4		89
8									2	4	3	4	6	8	7	7	9	6	2	4	2	2	66
7									3	3	4	10	6	8	8	14	8	7	5	1			77
6								5	2	3	5	2	7	7	10	6	6	6	6	2	1	1	69
5							1	3	3	7	7	10	11	10	11	4	6	6	3			1	83
4								1		2	6	11	2	5	4	5	6	4	2	2	2		52
3		1	1		1	1		4	5	6	4	9	8	4	3	7	3	3	1	1			59
2					2	3	4	6	5	10	6	5	4	6	5	1	7						64
1	1		3		2	4	6	5	8	12	4	14	8	6	8	3	3	1	2			1	91
0	11	4	5	8	10	9	13	14	24	18	17	17	9	9	4	2	1	1		1			177
f	12	5	9	9	16	18	33	42	63	81	77	93	86	101	101	82	90	51	37	24	17	

Table 78.—*Variables: Beta score, test 7 × alpha score, test 6. Group X: Special experimental group.*

ALPHA TEST 6.

BETA TEST 7.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	f
10		2		2	3	5	3	12	6	18	15	16	8	3	4	4	1	3				105
9	5	2		4	2	3	6	8	6	15	12	17	7	8	3	1	1	2				102
8	4	6	1	2	4	4	9	10	10	8	9	4	4	1								76
7	6	6	3	5	5	9	7	12	15	10	12	5	5	3		2	1					106
6	7	10	7	10	6	17	11	7	10	5	7	7	6		1	1			1			113
5	10	8	9	10	11	16	10	12	11	13	12	5	4	2	2	1	1					137
4	18	17	9	6	8	6	6	9	5	9	2	2		1		1						99
3	21	3	12	5	4	8	6	4		8	4		1									76
2	19	12	3	4	6	8	5	1	1	1	3	1										64
1	30	12	7	4	1	4	3	1	1	1			1									65
0	57	13	13	7	2	3	3	1	1	1	2		1									104
f	177	91	61	59	52	83	69	77	66	89	78	57	37	18	10	10	4	5	1			

TABLE 79.—*Variables: Alpha score, test 7 × alpha score, test 8. Group X: Special experimental group.*

ALPHA TEST 8.

ALPHA TEST 7.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	*f*
40	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
38–39	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1
36–37	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	....	1	....	1	....	4
34–35	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	....	1	1	....	1	....	5
32–33	....	....	....	....	....	1	....	....	....	1	....	....	....	1	1	1	....	1	3	....	....	9
30–31	....	....	....	....	....	....	1	....	....	....	....	1	....	2	....	1	....	1	1	....	....	7
28–29	....	....	....	....	....	....	....	1	....	....	....	1	2	3	2	....	3	....	....	....	....	12
26–27	....	....	....	....	....	....	....	....	1	....	....	....	1	1	....	....	2	2	2	....	....	9
24–25	....	....	....	....	....	....	....	2	1	1	....	3	1	1	....	1	1	....	....	1	....	13
22–23	....	....	....	....	....	....	1	2	1	3	2	4	1	2	2	1	....	....	....	....	....	19
20–21	....	....	....	....	....	....	....	1	4	....	1	....	2	1	4	3	1	1	....	....	....	18
18–19	....	....	....	1	1	....	1	1	....	3	....	1	3	1	3	2	....	....	1	....	....	18
16–17	....	....	....	1	....	1	2	1	2	....	4	3	....	....	1	1	....	2	....	....	....	18
14–15	....	....	....	2	....	1	1	1	4	3	4	2	6	4	4	4	2	2	....	....	....	40
12–13	....	....	1	3	2	3	1	2	4	7	3	3	2	5	6	2	5	....	3	....	....	52
10–11	1	1	1	4	3	6	4	1	9	7	6	....	2	6	1	3	1	1	....	....	....	57
8–9	....	1	1	4	7	8	13	11	14	5	8	3	6	1	9	1	1	1	....	....	....	94
6–7	4	5	5	10	6	10	6	11	10	8	7	1	8	2	1	1	2	1	....	....	....	98
4–5	4	4	10	21	13	18	16	6	6	8	6	6	6	....	....	[illegible]	1	....	....	....	....	127
2–3	17	13	22	24	14	19	12	7	8	10	3	6	3	2	1	....	1	....	....	....	....	162
0–1	133	31	29	24	17	15	10	9	5	5	1	2	1	1	....	1	....	....	....	....	....	284
f	159	55	69	94	63	82	68	56	69	61	46	37	44	34	36	24	21	15	10	4	....	

TABLE 80.—*Variables: Beta score, test 1 × alpha score, test 7. Group X: Special experimental group.*

ALPHA TEST 7.

BETA TEST 1.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	*f*
10	7	7	9	5	5	10	7	6	1	7	5	4	4	4	2	3	3	3	3	....	....	95
9	12	19	14	19	19	13	7	8	4	3	4	6	4	....	3	1	1	....	....	1	....	138
8	50	17	28	27	20	16	14	13	8	3	6	3	2	5	....	2	2	1	1	....	....	218
7	49	29	23	17	18	5	10	7	1	1	2	4	3	....	3	1	2	1	....	....	....	176
6	39	23	19	10	15	5	9	4	1	1	....	1	....	....	3	....	....	....	....	....	....	130
5	20	19	15	8	5	3	2	2	....	1	....	....	....	....	....	....	1	....	....	....	....	85
4	33	19	5	6	4	3	1	....	....	1	1	1	....	....	1	....	....	....	....	....	....	75
3	24	11	5	2	3	....	....	....	2	1	....	....	....	....	....	....	....	....	....	....	....	48
2	18	9	4	2	4	2	1	8	1	....	....	....	....	....	....	....	....	....	....	....	....	41
1	8	7	3	2	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	22
0	15	2	2	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	19
f	284	162	127	98	94	57	52	40	18	18	18	19	13	9	12	7	9	5	4	1	....	

TABLE 81.—*Variables: Beta score, test 2 × alpha score, test 7. Group X: Special experimental group.*

ALPHA TEST 7.

BETA TEST 2.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	*f*
16	....	2	2	3	5	2	3	2	1	1	4	1	3	....	2	1	2	....	1	1	....	36
15	1	6	7	8	6	5	6	5	1	5	....	4	1	2	2	2	1	....	....	....	....	62
14	4	5	8	14	8	6	9	6	5	4	3	3	2	3	2	2	2	2	1	....	....	89
13	10	13	13	9	15	9	8	7	2	1	5	3	2	....	....	1	3	2	1	....	....	104
12	16	14	14	5	8	8	5	4	2	....	....	5	2	1	1	....	....	1	....	....	....	86
11	15	16	15	14	7	13	5	7	1	2	....	....	1	....	2	1	....	....	....	....	....	99
10	16	18	14	8	8	4	3	3	3	2	....	....	1	2	1	....	....	....	....	....	....	83
9	18	12	12	7	7	2	3	2	2	1	2	1	....	....	1	....	....	....	....	....	....	70
8	25	15	5	4	4	2	3	....	....	2	1	....	....	....	....	....	....	....	....	....	....	61
7	20	10	8	4	6	1	2	1	1	....	1	1	....	....	....	....	....	....	....	....	....	55
6	18	10	6	4	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	39
5	27	11	3	2	3	1	....	1	....	....	....	....	....	1	....	....	....	....	....	....	....	49
4	21	7	5	6	2	....	2	1	....	....	1	....	....	....	1	....	1	....	....	....	....	47
3	18	5	5	2	4	3	2	....	....	....	1	....	....	....	....	....	....	....	....	....	....	40
2	18	4	1	2	6	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	32
1	23	5	6	2	2	1	....	1	....	....	....	1	....	....	....	....	....	....	....	....	....	41
0	34	9	3	4	2	....	....	....	....	....	....	....	1	....	....	....	....	....	1	....	....	54
f	284	162	127	98	94	57	52	40	18	18	18	19	13	9	12	7	9	5	4	1	....	

Table 82.—*Variables: Beta score, test 3 × beta score, test 7. Group X: Special experimental group.*

ALPHA TEST 7.

BETA TEST 3.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	f
12	...	4	8	5	9	6	10	9	1	5	4	8	5	4	5	4	4	2	2	1	...	96
11	8	6	6	13	11	9	10	6	5	6	5	6	3	3	4	...	2	1	...	...	...	104
10	9	23	18	23	21	17	14	10	4	4	5	4	3	2	2	2	2	2	...	...	...	165
9	19	20	21	15	18	7	9	7	2	1	1	...	...	...	1	1	...	...	2	...	...	124
8	17	16	10	9	10	2	2	2	3	1	1	1	...	...	...	...	...	...	...	...	...	74
7	16	10	10	4	3	4	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	49
6	12	11	8	1	5	1	3	3	2	...	1	...	1	...	...	...	1	...	...	...	...	49
5	22	16	11	8	7	4	2	2	...	...	1	...	...	...	...	...	...	...	...	...	...	73
4	25	7	9	5	3	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	51
3	21	11	6	2	2	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	44
2	30	14	6	3	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	59
1	39	13	8	6	1	1	1	1	...	...	...	...	1	...	...	...	...	...	...	...	...	71
0	46	11	6	4	3	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	72
f	284	162	127	98	94	57	52	40	18	18	18	19	13	9	12	7	9	5	4	1	...	

Table 83.—*Variables: Beta score, test 4 × alpha score, test 7. Group X: Special experimental group.*

ALPHA TEST 7.

BETA TEST 4.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40–41	f
30	1	1	1	1	...	3	1	...	2	...	1	2	...	2	...	3	1	...	1	...	...	20
28–29	...	1	...	1	...	1	2	...	...	...	...	1	...	...	2	...	1	...	...	...	...	9
26–27	1	...	...	1	2	...	1	2	1	2	...	1	4	...	...	1	...	...	2	...	...	18
24–25	2	3	1	5	4	4	2	6	...	3	2	4	...	2	2	...	...	...	1	...	...	41
22–23	...	4	4	5	4	4	8	4	3	1	1	2	2	2	2	...	1	2	...	...	...	49
20–21	1	7	5	11	8	8	7	4	3	4	8	6	5	...	...	1	3	1	...	...	...	82
18–19	5	11	13	8	15	9	1	6	4	1	2	1	...	1	3	...	...	1	...	...	...	81
16–17	16	11	20	14	11	8	15	6	...	4	3	...	1	...	2	2	3	1	...	...	...	117
14–15	28	18	22	12	18	9	4	7	3	2	1	2	...	2	...	...	...	...	...	1	...	129
12–13	17	14	18	14	14	5	6	2	1	...	...	...	1	...	1	...	...	...	...	...	...	93
10–11	32	21	14	12	10	4	1	2	...	1	...	...	...	...	...	...	...	...	...	...	...	97
8– 9	25	20	8	6	3	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	64
6– 7	32	16	5	3	3	1	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	62
4– 5	31	13	4	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	51
2– 3	36	6	5	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	50
0– 1	57	16	7	1	...	1	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	84
f	284	162	127	98	94	57	52	40	18	18	18	19	13	9	12	7	9	5	4	1	...	

Table 84.—*Variables: Alpha score, test 7 × beta score, test 5. Group X: Special experimental group.*

BETA TEST 5.

ALPHA TEST 7.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	f
40	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
38–39	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1
36–37	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	2	...	...	...	...	4
34–35	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	2	1	...	1	...	...	...	5
32–33	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	2	...	...	1	1	...	1	2	1	9
30–31	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	...	...	...	...	1	1	...	1	2	7
28–29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	...	3	1	2	1	...	1	2	12
26–27	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	1	2	3	1	...	1	9
24–25	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	2	2	...	2	3	1	1	13
22–23	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	1	1	1	3	4	1	1	2	2	1	...	19
20–21	...	...	...	...	...	...	...	...	...	...	...	1	...	1	1	...	1	1	2	1	...	1	5	2	2	...	18
18–19	...	...	1	...	...	...	...	...	...	...	1	...	2	...	1	1	1	...	...	3	2	...	2	...	2	2	18
16–17	...	...	...	...	...	...	...	...	...	...	...	1	...	2	3	...	1	2	2	2	...	1	1	1	1	1	18
14–15	...	...	...	...	...	...	...	...	...	...	...	1	1	2	2	6	3	5	5	5	2	3	1	2	1	1	40
12–13	...	...	...	...	...	...	1	...	...	1	...	2	2	3	3	4	5	3	5	8	4	2	1	4	3	1	52
10–11	...	...	...	...	...	...	...	1	1	...	2	...	2	1	2	5	7	4	3	8	10	1	4	2	3	...	57
8– 9	2	...	...	1	1	...	1	2	3	1	3	1	5	6	7	12	9	9	7	2	7	3	3	5	1	3	94
6– 7	...	...	2	...	1	1	1	2	1	4	3	6	4	9	7	8	2	7	9	12	2	7	4	5	1	...	98
4– 5	3	...	1	...	...	1	2	5	5	4	7	6	10	12	12	16	7	8	9	6	3	2	4	1	2	1	127
2– 3	8	1	3	2	4	2	5	7	6	10	14	10	12	6	19	9	13	9	10	4	4	1	2	...	1	...	162
0– 1	42	16	18	11	13	4	21	20	18	20	13	19	14	11	8	8	4	10	5	1	1	1	1	1	1	3	284
f	55	17	21	15	19	9	31	37	34	41	43	49	52	55	72	76	50	65	70	61	32	33	39	30	19	19	

TABLE 85.—*Variables: Alpha score, test 7 × beta score, test 6. Group X: Special experimental group.*

BETA TEST 6.

ALPHA TEST 7.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	*f*
40	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
38–39	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1
36–37	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	1	....	1	4
34–35	....	....	....	....	....	....	....	....	....	....	....	....	1	....	2	....	....	....	1	1	....	5
32–33	....	....	....	....	....	....	....	....	....	....	....	....	1	1	1	....	3	2	....	1	....	9
30–31	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	1	....	1	....	3	7
28–29	....	....	....	....	....	....	....	....	....	....	1	1	1	2	2	2	....	2	....	....	1	12
26–27	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	1	4	....	2	....	....	9
24–25	....	....	....	....	....	....	....	....	....	....	....	....	1	2	2	1	2	1	....	1	3	13
22–23	....	....	....	....	....	....	....	....	....	....	1	....	3	2	3	3	2	3	1	1	....	19
20–21	....	....	....	....	....	....	....	....	1	....	....	....	....	1	4	1	2	4	4	1	....	18
18–19	....	....	....	....	....	....	....	....	....	....	1	1	3	....	....	5	3	2	....	2	1	18
16–17	....	....	....	1	....	....	....	....	1	2	1	4	1	2	2	2	1	....	....	1	....	18
14–15	....	....	....	....	....	....	....	1	....	2	1	2	3	1	7	4	4	4	6	4	1	40
12–13	....	....	....	....	....	....	....	....	1	3	1	2	1	6	8	10	11	1	7	1	....	52
10–11	....	....	....	....	....	....	....	1	....	....	4	7	6	7	7	8	8	5	2	2	....	57
8– 9	....	....	....	1	....	....	1	3	5	3	8	6	9	15	10	9	13	4	2	2	3	94
6– 7	....	1	....	....	1	....	4	1	1	8	10	9	14	12	13	8	7	4	3	2	....	98
4– 5	1	1	....	....	1	1	1	3	8	13	5	19	11	16	14	9	13	4	4	3	....	127
2– 3	1	....	3	1	2	2	7	9	11	17	18	16	16	17	13	11	7	8	1	1	1	162
0– 1	10	3	6	6	12	15	20	24	35	33	26	26	15	14	12	8	7	6	2	1	3	284
f	12	5	9	9	16	18	33	42	63	81	77	93	86	101	101	82	90	51	37	24	17	

TABLE 86.—*Variables: Beta score, test 7 × alpha score, test 7. Group X: Special experimental group.*

ALPHA TEST 7.

BETA TEST 7.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	*f*
10	5	12	6	14	8	8	7	6	1	2	6	7	5	3	4	5	4	2	....	....	....	105
9	12	12	8	6	11	3	11	7	3	3	4	6	4	3	2	1	2	2	2	....	....	102
8	12	6	4	11	11	10	5	5	1	3	2	1	1	....	....	1	1	....	1	1	....	76
7	16	14	18	6	11	7	5	9	5	2	3	3	1	2	3	....	....	....	1	....	....	106
6	20	16	23	10	13	11	5	5	3	1	2	....	1	....	2	....	....	1	....	....	....	113
5	28	24	21	15	16	8	8	5	3	5	1	1	....	....	1	....	1	....	....	....	....	137
4	24	20	17	15	7	6	6	1	....	1	....	....	1	....	....	....	1	....	....	....	....	99
3	29	16	12	5	9	2	1	1	....	1	....	....	....	....	....	....	....	....	....	....	....	76
2	29	14	5	7	4	....	2	....	1	....	....	1	....	1	....	....	....	....	....	....	....	64
1	40	11	5	5	3	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	65
0	69	17	8	4	1	2	2	1	....	....	....	....	....	....	....	....	....	....	....	....	....	104
f	284	162	127	98	94	57	52	40	18	18	18	19	13	9	12	7	9	5	4	1	....	

TABLE 87.—*Variables: Beta score, test 1 × alpha score, test 8. Group X: Special experimental group.*

ALPHA TEST 8.

BETA TEST 1.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	*f*
10	3	2	3	5	3	8	4	6	6	6	5	4	7	8	5	7	4	5	2	2	....	95
9	3	3	5	9	5	10	9	11	14	6	12	6	13	7	10	6	3	4	2	....	....	138
8	18	9	11	20	18	21	12	15	19	14	7	9	11	6	10	4	7	4	2	1	....	218
7	16	12	16	20	11	11	19	8	10	11	7	8	6	7	3	3	3	2	2	1	....	176
6	22	9	10	13	11	9	5	6	6	8	8	4	4	5	4	1	4	....	1	....	....	130
5	22	10	5	7	2	5	7	2	7	7	4	3	....	....	2	2	....	....	....	....	....	85
4	30	3	8	4	3	8	4	4	4	1	1	....	1	....	2	1	....	....	1	....	....	75
3	14	3	6	7	1	3	3	3	1	4	1	1	1	....	....	....	....	....	....	....	....	48
2	13	2	1	3	5	4	4	1	2	1	1	2	1	1	....	....	....	....	....	....	....	41
1	6	2	3	4	1	3	....	....	....	3	....	....	....	....	....	....	....	....	....	....	....	22
0	12	....	1	2	3	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	19
f	159	55	69	94	63	82	68	56	69	61	46	37	44	34	36	24	21	15	10	4	....	

TABLE 88.—*Variables: Beta score, test 2 × alpha score, test 8. Group X: Special experimental group.*

ALPHA TEST 8.

BETA TEST 2.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	f
16	....	....	....	2	....	2	....	4	3	3	3	4	....	6	3	1	2	3	....	....	....	36
15	2	1	....	2	4	6	1	4	5	6	6	3	5	5	5	4	1	1	1	....	....	62
14	2	1	2	4	2	5	7	4	10	7	5	6	8	2	10	3	3	5	2	1	....	89
13	....	3	7	5	3	7	8	9	3	10	6	6	9	5	7	4	4	4	3	2	....	104
12	5	3	3	6	6	9	8	9	7	4	7	5	2	5	1	....	3	1	1	1	....	86
11	4	4	8	11	3	8	9	5	10	4	5	6	7	6	6	2	1	....	....	....	....	99
10	11	3	6	7	8	8	10	3	9	3	2	1	3	2	1	2	3	....	1	....	....	83
9	7	4	7	8	7	4	5	6	4	6	2	1	4	....	....	2	3	....	....	....	....	70
8	9	5	9	2	8	8	1	3	3	3	3	1	1	1	1	1	1	....	1	....	....	61
7	8	5	7	10	3	4	5	1	4	2	2	1	1	1	1	....	....	....	....	....	....	55
6	11	5	2	7	1	4	1	4	1	1	1	1	....	....	....	....	....	....	....	....	....	39
5	20	5	5	4	5	3	3	....	1	2	....	....	....	....	....	....	....	....	....	....	....	49
4	11	3	3	9	5	1	4	2	1	4	....	....	2	....	....	1	....	1	....	....	....	47
3	13	3	2	4	2	6	1	....	2	3	1	....	....	....	....	3	....	....	....	....	....	40
2	11	3	4	3	1	....	3	....	2	1	1	1	1	....	....	....	....	....	1	....	....	32
1	20	3	1	4	2	3	1	1	3	....	1	....	....	1	....	1	....	....	....	....	....	41
0	25	4	3	6	3	4	2	1	1	2	....	1	1	....	1	....	....	....	....	....	....	54
f	159	55	69	94	63	82	68	56	69	61	46	37	44	34	36	24	21	15	10	4	....	

TABLE 89.—*Variables: Beta score test 3 × alpha score, test 8. Group X: Special experimental group.*

ALPHA TEST 8.

BETA TEST 3.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	f
12	....	....	....	2	2	7	2	2	5	8	5	7	10	9	12	6	9	6	3	1	....	96
11	....	1	4	2	5	4	6	6	11	4	5	7	8	11	7	7	4	5	5	2	....	104
10	2	1	5	12	7	12	9	20	20	13	13	9	11	7	9	6	6	1	1	1	....	165
9	4	6	10	16	11	11	14	10	7	6	10	5	4	1	3	3	....	2	1	....	....	124
8	7	5	5	9	6	7	8	3	5	5	3	3	3	1	3	1	....	....	....	....	....	74
7	9	4	5	7	4	5	1	3	2	5	2	1	....	1	....	....	....	....	....	....	....	49
6	5	4	5	3	2	5	5	3	4	3	2	1	3	1	1	1	....	1	....	....	....	49
5	8	8	8	4	6	5	8	3	5	8	5	1	2	1	....	....	1	....	....	....	....	73
4	10	2	8	12	4	2	1	3	2	....	3	....	....	....	....	....	....	....	....	....	....	51
3	12	3	3	4	3	7	6	....	1	2	....	....	1	2	....	....	....	....	....	....	....	44
2	34	8	6	6	6	7	4	2	1	....	....	....	....	....	1	....	....	....	....	....	....	75
1	29	7	3	8	2	7	3	2	3	4	1	....	1	....	....	....	1	....	....	....	....	71
0	39	6	7	9	5	1	....	1	2	1	....	....	1	....	....	....	....	....	....	....	....	72
f	159	55	69	94	63	82	68	56	69	61	46	37	44	34	36	24	21	15	10	4	....	

TABLE 90.—*Variables: Beta score, test 4 × alpha score, test 8. Group X: Special experimental group.*

ALPHA TEST 8.

BETA TEST 4.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	f
30	....	1	....	....	....	....	1	....	2	....	1	2	1	3	3	1	1	3	1	....	....	20
28–29	....	....	....	....	....	....	....	2	....	2	1	....	....	2	1	....	1	....	....	....	....	9
26–27	....	....	....	....	1	....	....	1	1	2	1	1	1	....	3	4	....	1	1	1	....	18
24–25	....	1	....	1	1	1	1	3	3	4	1	6	7	3	4	1	2	1	1	....	....	41
22–23	....	....	....	....	3	3	3	3	4	1	5	1	5	6	5	1	1	6	2	....	....	49
20–21	....	1	....	4	....	1	3	7	10	6	6	8	9	5	5	8	4	2	....	3	....	82
18–19	....	....	4	7	1	10	6	2	12	8	7	3	5	3	5	4	4	....	....	....	....	81
16–17	4	3	4	6	10	14	9	10	9	12	7	5	5	6	4	2	4	....	3	....	....	117
14–15	7	7	8	13	10	12	10	12	7	7	10	8	5	3	4	2	1	2	1	....	....	129
12–13	4	3	6	14	9	9	14	7	10	5	3	1	3	....	1	1	2	....	1	....	....	93
10–11	7	10	11	18	4	14	8	6	3	7	2	2	2	2	1	....	....	....	....	....	....	97
8–9	10	10	9	13	8	3	4	1	1	4	....	....	1	....	....	....	....	....	....	....	....	64
6–7	21	6	12	3	3	6	5	....	4	1	1	....	....	....	....	....	....	....	....	....	....	62
4–5	25	3	7	4	5	4	2	....	1	....	....	....	....	....	....	....	....	....	....	....	....	51
2–3	29	7	3	4	1	3	1	....	2	....	....	....	....	....	....	....	....	....	....	....	....	50
0–1	52	3	5	7	7	2	1	2	....	2	....	....	....	1	....	....	1	....	....	....	....	84
f	159	55	69	94	63	82	68	56	69	61	46	37	44	34	36	24	21	15	10	4	....	

TABLE 91.—*Variables: Alpha score, test 8 × beta score, test 5. Group X: Special experimental group.*

BETA TEST 5.

ALPHA TEST 8.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	*f*
40	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
38–39	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	2	....	....	....	4
36–37	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	1	....	1	1	....	1	1	1	....	2	....	10
34–35	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	4	2	2	3	3	....	....	....	15
32–33	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	3	....	2	2	2	2	3	3	1	1	....	21
30–31	....	....	....	....	....	....	....	....	....	....	1	1	1	1	2	....	3	2	2	4	1	2	1	....	1	2	24
28–29	....	....	....	1	....	....	....	1	1	....	....	....	....	....	2	3	2	2	4	4	4	2	2	4	2	2	36
26–27	....	....	....	....	....	....	....	....	....	....	....	....	1	1	1	2	....	3	2	8	4	1	3	3	1	4	34
24–25	....	....	....	....	1	....	....	....	....	....	1	1	1	2	....	2	6	4	4	4	1	4	5	3	1	4	44
22–23	....	....	....	....	....	....	....	....	....	1	1	....	2	....	1	8	2	2	3	2	5	2	2	3	2	1	37
20–21	....	....	....	....	....	....	1	....	....	....	2	3	....	3	5	3	2	8	8	3	1	2	3	1	1	....	46
18–19	1	....	1	....	....	1	....	1	1	1	....	2	3	4	6	5	6	7	6	4	....	3	3	2	1	3	61
16–17	....	....	....	....	....	....	1	2	1	3	2	3	1	6	9	5	9	5	5	6	2	2	2	3	1	1	69
14–15	1	....	2	....	....	....	....	....	1	2	2	....	3	6	6	5	2	2	7	4	3	1	4	3	1	1	56
12–13	2	....	....	1	....	....	....	2	2	3	2	2	7	6	9	8	5	5	3	7	1	2	....	1	....	....	68
10–11	1	....	....	2	....	....	1	3	2	3	3	9	4	10	6	7	5	5	7	5	1	2	2	2	2	....	82
8– 9	3	....	....	1	2	....	1	3	1	2	8	6	6	1	4	5	....	4	6	1	3	....	2	2	1	1	63
6– 7	5	....	1	....	....	3	7	1	3	7	8	7	8	6	10	5	5	6	3	4	....	2	1	1	1	....	94
4– 5	1	2	4	....	1	2	3	6	4	8	5	2	6	4	7	7	2	1	2	....	....	....	....	1	....	1	69
2– 3	1	....	5	....	3	....	1	5	6	6	5	6	5	....	2	6	1	1	1	....	1	....	....	....	....	....	55
0– 1	40	15	11	10	12	3	16	13	12	5	3	6	3	4	1	1	....	4	....	....	....	....	....	....	....	....	159
f	55	17	24	15	19	9	31	37	34	41	43	49	52	55	72	76	50	65	70	61	32	33	39	30	18	20	

TABLE 92.—*Variables: Alpha score, test 8 × beta score, test 6. Group X: Special experimental group.*

BETA TEST 6.

ALPHA TEST 8.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	*f*
40	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
38–39	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	3	....	....	....	....	4
36–37	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	1	3	2	....	1	1	10
34–35	....	....	....	....	....	....	....	....	....	1	....	1	....	....	2	1	2	1	3	1	3	15
32–33	....	....	....	....	....	....	....	....	....	1	....	....	....	2	3	4	4	4	1	2	....	21
30–31	....	....	....	....	....	....	....	....	....	1	....	1	2	1	2	4	6	....	2	2	3	24
28–29	....	....	....	....	....	....	....	1	....	....	2	1	1	2	8	2	6	4	5	3	1	36
26–27	....	....	....	....	....	....	1	....	....	....	1	....	1	2	9	8	3	2	4	1	2	34
24–25	....	....	....	....	....	....	....	....	....	3	2	1	2	5	6	4	8	7	5	1	....	44
22–23	....	....	....	....	....	....	....	....	....	....	....	2	1	7	5	3	12	2	1	1	3	37
20–21	....	....	....	....	1	....	....	....	1	2	3	2	4	7	9	7	3	4	1	1	1	46
18–19	....	....	....	....	....	1	....	1	1	1	2	2	5	8	5	11	8	8	2	3	2	61
16–17	....	....	....	....	....	....	....	2	1	3	2	10	3	10	9	5	7	7	5	4	1	69
14–15	....	....	....	....	....	....	1	1	....	1	2	2	6	9	8	6	6	5	6	2	1	56
12–13	....	....	....	....	....	....	....	....	2	5	2	8	12	4	12	5	8	4	3	1	2	68
10–11	....	....	....	....	....	....	....	3	3	5	5	9	11	12	10	9	4	4	3	3	....	1	82
8– 9	....	....	....	....	....	1	1	2	2	5	10	7	6	9	7	3	5	3	1	....	1	63
6– 7	....	....	....	1	1	2	1	4	8	6	12	8	11	11	9	5	8	5	....	1	1	94
4– 5	....	....	....	1	....	....	2	1	5	9	12	11	5	4	6	6	4	3	....	....	....	69
2– 3	....	....	....	1	2	2	1	5	4	9	5	5	9	4	2	2	....	1	3	....	....	55
0– 1	12	5	6	5	10	12	15	14	20	20	15	10	9	5	1	....	....	....	....	....	....	159
f	12	5	9	9	16	18	33	42	63	81	77	93	86	101	101	82	90	51	37	24	17	

TABLE 93.—*Variables: Beta score, test 7 × alpha score, test 8. Group X: Special experimental group.*

ALPHA TEST 8.

BETA TEST 7.	0– 1	2– 3	4– 5	6– 7	8– 9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30–31	32–33	34–35	36–37	38–39	40	*f*
10	1	3	4	7	5	7	5	4	10	6	6	5	5	3	11	8	7	2	5	1	....	105
9	1	1	5	3	2	8	6	13	5	10	6	3	8	12	4	4	3	6	....	2	....	102
8	4	3	3	6	4	2	6	4	9	3	8	7	5	2	4	1	3	1	1	....	....	76
7	3	8	1	14	6	9	9	6	11	7	3	5	11	7	2	3	2	1	2	1	....	106
6	5	3	13	12	11	11	9	6	9	9	3	5	5	3	3	3	2	1	....	....	....	113
5	14	7	8	10	12	13	7	9	13	7	11	4	4	4	5	4	3	1	1	....	....	137
4	14	6	11	10	5	13	11	2	6	7	4	4	3	1	....	....	....	1	1	....	....	99
3	16	7	7	9	3	2	5	7	2	4	1	2	1	2	5	1	1	1	....	....	....	76
2	16	7	11	9	6	2	5	2	2	1	2	....	....	....	....	....	....	1	....	....	....	64
1	29	7	5	6	2	8	2	2	....	....	1	1	2	....	....	....	....	....	....	....	....	65
0	56	8	1	8	7	7	3	1	2	7	1	1	....	....	2	....	....	....	....	....	....	104
f	159	55	69	94	63	82	68	56	69	61	46	37	44	34	36	24	21	15	10	4	....	

TABLE 94.—*Variables: Beta score, test 1 × beta score, test 2. Group X: Special experimental group.*

BETA TEST 2.

BETA TEST 1.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	*f*
10	....	....	....	1	1	1	1	2	1	2	7	12	10	17	16	13	11	95
9	....	....	3	3	2	1	2	7	4	11	11	17	10	23	21	13	10	138
8	10	2	6	5	6	8	10	8	15	7	18	21	28	30	19	18	6	218
7	9	4	2	7	7	8	6	12	10	16	20	14	19	13	14	11	4	176
6	6	4	8	2	8	6	4	9	8	12	10	15	10	15	9	3	1	130
5	6	7	4	3	7	8	5	5	6	7	8	8	3	1	5	1	1	85
4	7	7	3	4	3	7	4	3	9	5	4	6	3	2	4	2	2	75
3	3	7	2	3	8	4	2	4	2	5	2	2	....	3	....	....	1	48
2	6	6	1	6	2	2	2	2	5	1	2	3	1	....	1	1	....	41
1	2	2	1	3	3	2	3	1	....	3	1	1	....	....	....	....	....	22
0	5	2	2	3	....	2	....	2	....	1	....	....	1	....	....	....	....	19
f	54	41	32	40	47	49	39	55	61	70	83	99	86	104	89	62	36	

TABLE 95.—*Variables: Beta score, test 1 × beta score, test 3. GroupX : Special experimental group.*

BETA TEST 3.

BETA TEST 1.	0	1	2	3	4	5	6	7	8	9	10	11	12	*f*
10	1	....	1	1	1	3	1	....	6	10	26	18	27	95
9	4	2	5	1	5	5	3	3	10	16	28	32	24	138
8	6	5	9	6	13	19	11	9	19	31	42	25	23	218
7	8	11	9	9	9	17	12	9	17	17	33	16	9	176
6	6	8	11	7	8	8	6	9	7	29	17	8	6	130
5	13	10	8	3	6	7	5	7	4	10	10	....	2	85
4	8	13	14	7	4	4	3	1	5	5	4	4	3	75
3	7	11	8	1	....	1	6	6	3	2	2	....	1	48
2	6	6	4	6	3	4	1	3	....	4	2	1	1	41
1	6	3	4	1	1	3	....	1	2	....	1	....	....	22
0	7	2	2	2	1	2	1	1	1	....	....	....	....	19
f	72	71	75	44	51	73	49	49	74	124	165	104	96	

TABLE 96.—*Variables: Beta score, test 1 × beta score, test 4. Group X: Special experimental group.*

BETA TEST 4.

BETA TEST 1.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30	*f*
10	....	....	3	1	....	4	4	12	12	6	13	14	9	7	5	5	95
9	3	1	....	1	4	9	8	22	20	18	20	9	8	6	1	8	138
8	2	5	7	8	11	26	22	30	26	20	22	15	15	2	2	5	218
7	7	7	7	14	20	15	18	24	24	20	11	4	2	1	1	1	176
6	9	11	10	7	12	13	16	14	14	8	7	4	3	2	....	....	130
5	12	6	9	7	6	11	8	6	8	2	5	2	3	....	....	....	85
4	18	5	5	10	3	9	7	7	7	3	....	....	1	....	....	....	75
3	8	5	5	6	3	6	5	5	....	2	2	1	....	....	....	....	48
2	7	4	3	7	5	2	2	5	4	1	1	....	....	....	....	....	41
1	7	5	1	1	....	1	1	2	1	1	1	....	....	....	....	1	22
0	11	1	....	1	....	1	2	2	1	....	....	....	....	....	....	....	19
f	84	50	50	63	64	97	93	129	117	81	82	49	41	18	9	20	

TABLE 97.—*Variables: Beta score, test 1 × beta score, test 5. Group X: Special experimental group.*

BETA TEST 5.

BETA TEST 1.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	*f*
10	....	....	1	1	1	....	....	....	....	1	1	3	5	5	2	7	2	6	8	13	7	5	11	6	6	4	95
9	1	....	1	....	....	....	2	3	1	5	....	2	7	9	12	9	9	14	16	12	8	7	5	7	7	5	138
8	5	1	3	1	2	4	2	9	10	5	7	16	10	10	8	26	11	17	13	12	7	11	8	12	2	6	218
7	8	1	1	3	2	....	6	8	8	11	9	12	9	11	13	9	10	7	16	13	4	4	7	3	2	2	176
6	6	1	1	2	4	2	4	6	7	5	9	8	7	6	12	8	8	8	6	7	4	2	3	1	1	2	130
5	7	2	5	4	1	....	2	4	4	6	4	3	5	4	10	8	5	3	1	1	1	2	2	1	....	....	85
4	9	2	5	2	4	1	4	3	1	4	9	1	5	3	4	4	4	1	4	2	....	1	1	....	....	1	75
3	7	3	4	....	....	1	4	2	1	6	....	3	2	4	4	1	1	1	2	....	....	....	2	....	....	....	48
2	5	2	3	1	1	1	5	1	2	1	2	....	1	1	4	3	....	3	3	....	1	1	....	....	....	....	41
1	2	3	....	1	2	....	1	1	....	1	2	1	....	1	2	1	....	3	1	....	....	....	....	....	....	....	22
0	8	2	....	....	2	....	1	....	....	....	....	....	1	1	1	....	....	2	....	1	....	....	....	....	....	....	19
f	55	17	24	15	19	9	31	37	34	41	43	49	52	55	72	76	50	65	70	61	32	33	39	30	18	20	

TABLE 98.—*Variables: Beta score, test 1 × beta score, test 6. Group X: Special experimental group.*

BETA TEST 6.

BETA TEST 1.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	*f*
10	....	....	....	1	....	....	2	....	1	2	3	2	8	11	10	9	14	7	13	5	7	95
9	....	....	....	1	....	....	....	....	3	9	7	12	7	9	18	16	15	15	10	10	6	138
8	1	....	....	....	2	2	6	7	6	14	14	20	22	20	26	27	31	9	5	5	1	218
7	....	....	....	....	2	....	6	7	14	11	15	16	14	33	19	12	10	10	3	2	2	176
6	....	....	2	1	1	3	1	7	9	15	9	11	10	13	15	11	7	7	6	1	1	130
5	2	2	1	1	3	2	2	5	6	9	8	15	7	5	6	5	5	1	....	....	....	85
4	1	1	4	....	2	5	6	6	7	6	5	9	9	2	4	2	5	....	....	1	....	75
3	....	....	1	2	3	2	5	4	7	6	6	2	4	3	1	....	1	1	....	....	....	48
2	4	1	....	1	....	1	3	2	6	4	6	5	3	3	1	....	1	....	....	....	....	41
1	1	....	1	....	2	1	1	1	4	3	2	1	2	1	1	....	1	....	....	....	....	22
0	3	1	....	2	1	2	1	3	....	2	2	....	....	1	....	....	....	1	....	....	....	19
f	12	5	9	9	16	18	33	42	63	81	77	93	86	101	101	82	90	51	37	24	17	

TABLE 99.—*Variables: Beta score, test 1 × beta score, test 7. Group X: Special experimental group.*

BETA TEST 7.

BETA TEST 1.	0	1	2	3	4	5	6	7	8	9	10	*f*
10	....	2	1	1	5	9	9	12	4	22	30	95
9	4	1	1	9	8	15	14	25	19	17	25	138
8	9	8	9	12	21	35	22	22	26	28	26	218
7	12	9	9	13	19	35	19	21	8	21	10	176
6	11	8	15	8	13	14	22	11	11	9	8	130
5	15	9	6	9	12	10	8	9	4	....	3	85
4	10	12	13	10	9	3	9	2	1	3	3	75
3	16	3	5	7	4	8	2	1	1	1	....	48
2	10	9	3	2	1	7	5	3	1	....	....	41
1	8	....	1	4	4	1	3	....	....	1	....	22
0	9	4	1	1	3	....	....	....	1	....	....	19
f	104	65	64	76	99	137	113	106	76	102	105	

TABLE 100.—*Variables: Beta score, test 3 × beta score, test 2. Group X: Special experimental group.*

BETA TEST 2.

BETA TEST 3.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	*f*
12	....	1	....	....	1	....	1	1	2	4	6	7	9	11	20	18	15	96
11	2	....	1	....	3	....	....	3	2	3	6	14	12	22	18	11	7	104
10	1	1	1	2	1	3	3	5	9	13	10	18	23	28	22	17	8	165
9	3	....	5	3	4	3	1	8	5	12	18	14	15	16	10	3	4	124
8	1	2	1	3	1	5	3	4	5	4	11	12	6	7	7	2	....	74
7	2	1	1	2	1	2	3	5	7	5	4	5	2	3	3	3	....	49
6	1	1	....	1	4	2	3	4	2	3	4	9	4	6	2	1	2	49
5	1	3	2	2	9	5	5	6	4	8	9	4	8	6	2	4	....	73
4	1	3	3	1	1	5	1	3	6	3	7	5	3	2	2	....	....	51
3	5	6	4	2	2	2	5	4	3	2	2	4	1	1	1	....	....	44
2	6	7	5	6	7	6	4	5	8	8	2	4	4	....	2	1	....	75
1	9	5	3	13	8	11	6	4	5	3	1	1	1	1	....	....	....	71
0	17	11	6	5	5	5	4	3	3	2	3	2	3	1	....	2	....	72
f	54	41	32	40	47	49	39	55	61	70	83	99	86	104	89	62	36	

TABLE 101.—*Variables: Beta score, test 2 × beta score, test 4. Group X: Special experimental group.*

BETA TEST 4.

BETA TEST 2.	0–1	2–3	4–5	6–7	8–9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30	*f*
16	....	....	....	....	....	2	1	1	7	3	6	5	4	2	1	4	36
15	....	....	....	1	2	1	2	8	11	6	7	7	6	4	2	5	62
14	1	....	2	....	1	4	8	8	12	18	15	8	5	3	2	2	89
13	4	....	....	....	2	8	9	15	15	12	18	2	7	5	1	5	104
12	2	2	3	3	3	9	15	9	10	9	6	5	7	....	1	2	86
11	....	1	....	3	5	16	9	16	19	7	11	7	3	....	1	1	99
10	7	1	2	8	8	7	10	16	7	4	6	2	3	2	....	....	83
9	4	4	5	4	5	8	7	8	6	9	6	1	2	....	1	....	70
8	2	1	4	3	10	6	11	13	4	2	1	3	1	....	....	....	61
7	2	6	4	3	5	8	4	10	7	1	1	3	....	1	....	....	55
6	5	3	2	9	3	4	1	7	2	1	....	1	....	....	....	1	39
5	10	9	4	7	5	4	1	1	4	2	1	1	....	....	....	....	49
4	4	4	6	5	3	9	6	1	3	2	1	3	....	....	....	....	47
3	5	5	4	4	4	4	1	4	5	1	2	....	1	....	....	....	40
2	8	3	6	2	5	2	1	4	1	....	....	....	....	....	....	....	32
1	15	7	3	3	1	1	3	4	1	2	1	....	....	....	....	....	41
0	15	4	6	7	2	3	4	4	3	2	....	1	2	1	....	....	54
f	84	50	51	62	64	96	93	129	117	82	82	49	41	18	9	20	

TABLE 102.—*Variables: Beta score, test 2 × beta score, test 5. Group X: Special experimental group.*

BETA TEST 5.

BETA TEST 2.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	*f*
16	....	....	....	....	....	....	....	....	....	....	....	1	....	....	2	2	2	2	2	2	3	6	7	3	2	2	36
15	....	....	1	....	1	....	....	....	....	1	....	1	....	4	4	4	5	4	6	7	5	4	4	4	3	4	62
14	....	....	....	....	....	....	....	2	....	3	2	....	4	6	4	4	3	11	9	9	5	8	9	5	2	3	89
13	....	....	1	....	....	2	....	3	1	2	1	3	2	5	5	16	8	6	16	12	4	2	5	3	5	2	104
12	3	....	....	....	....	....	2	1	1	1	7	3	5	3	6	6	6	5	7	13	4	4	6	2	....	1	86
11	1	....	....	....	....	....	....	....	3	5	5	4	10	7	9	13	4	10	8	8	3	3	....	4	1	1	99
10	2	....	....	2	3	....	2	5	4	3	7	4	5	5	7	9	6	4	1	2	4	....	1	4	1	2	83
9	3	....	....	1	2	....	1	5	1	2	3	3	5	7	7	5	1	5	6	1	....	2	5	3	2	....	70
8	....	2	....	1	....	....	3	4	5	4	3	5	4	4	5	4	3	4	4	3	1	1	....	....	....	1	61
7	3	1	2	1	1	....	4	3	2	4	3	5	2	1	7	3	2	4	1	1	....	1	....	....	1	3	55
6	4	1	1	....	3	4	1	....	....	3	1	5	3	2	3	2	1	1	....	2	....	....	1	1	....	....	39
5	4	2	3	6	2	1	1	5	4	4	1	3	4	2	2	1	1	2	2	....	....	....	....	....	....	....	49
4	4	2	5	1	1	....	1	2	2	5	5	4	2	2	1	2	1	2	1	1	1	1	....	....	....	1	47
3	3	2	2	1	1	....	6	3	2	1	1	1	1	1	3	1	3	3	4	....	....	....	....	....	1	....	40
2	5	2	2	....	....	1	4	2	2	1	1	2	3	1	1	3	....	1	1	....	....	....	....	....	....	....	32
1	6	3	4	2	4	....	2	1	4	1	1	1	1	3	3	1	1	1	2	....	....	....	....	....	....	....	41
0	17	2	3	....	1	1	4	1	3	1	2	4	1	2	3	....	2	....	2	....	2	1	1	1	....	....	54
f	55	17	24	15	19	9	31	37	34	41	43	49	52	55	72	76	50	65	70	61	32	33	39	30	18	20	

TABLE 103.—*Variables: Beta score, test 2 × beta score, test 6. Group X: Special experimental group.*

BETA TEST 6.

BETA TEST 2.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	*f*
16	....	....	....	....	....	....	....	1	....	....	1	....	4	3	7	1	5	3	7	2	2	36
15	....	....	....	1	....	....	....	....	1	4	6	....	6	11	4	9	7	4	2	1	6	62
14	....	....	....	....	....	1	....	....	....	5	4	7	3	5	15	7	14	9	7	9	3	89
13	....	....	....	....	....	....	1	....	1	5	3	5	11	11	16	15	14	6	11	2	3	104
12	....	....	....	....	....	1	1	2	3	4	4	12	10	10	8	10	11	7	2	....	1	86
11	....	....	....	1	....	....	....	3	2	5	9	12	8	11	13	11	10	9	3	2	....	99
10	1	....	....	....	....	1	2	1	5	5	7	9	6	17	5	6	8	4	1	4	1	83
9	....	....	....	....	....	....	3	3	2	8	3	6	9	8	6	8	9	4	1	....	....	70
8	....	....	....	....	....	2	2	5	8	3	3	6	8	6	9	3	5	....	....	....	1	61
7	....	....	....	1	2	....	2	2	6	6	5	9	3	7	5	3	....	1	2	1	....	55
6	....	....	1	....	4	3	2	2	1	4	5	9	4	....	1	1	1	1	....	....	....	39
5	....	....	1	....	2	2	5	4	8	8	7	4	2	2	1	2	....	1	....	....	....	49
4	1	1	1	....	....	2	2	5	9	3	3	2	3	4	5	1	1	1	....	3	....	47
3	....	....	....	1	5	1	3	5	5	3	2	7	....	4	2	1	1	....	....	....	....	40
2	1	1	1	2	....	1	2	2	1	7	6	2	4	....	....	1	1	....	....	....	....	32
1	....	....	4	1	3	2	7	3	5	5	2	1	2	....	2	1	2	....	1	....	....	41
0	9	3	1	2	....	2	1	4	6	6	7	2	3	2	2	2	1	1	....	....	....	54
f	12	5	9	9	16	18	33	42	63	81	77	93	86	101	101	82	90	51	37	24	17	

TABLE 104.—*Variables: Beta score, test 7 × beta score, test 2. Group X: Special experimental group.*

BETA TEST 2.

BETA TEST 7.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	*f*
10	....	....	1	1	2	....	....	2	2	1	5	15	12	24	19	12	9	105
9	2	....	1	....	1	1	2	3	3	4	8	12	10	20	11	22	4	102
8	3	....	2	1	1	1	1	4	6	2	7	9	6	9	13	3	8	76
7	....	3	2	1	3	2	3	6	3	13	10	8	16	11	15	7	3	106
6	2	....	1	....	8	6	....	4	7	12	13	15	14	9	12	7	3	113
5	4	2	3	8	3	3	6	8	10	14	13	19	11	13	8	7	5	137
4	6	3	....	4	5	3	8	9	6	8	9	11	10	11	3	2	1	99
3	2	7	4	5	9	....	5	7	8	2	7	3	5	5	5	....	2	76
2	6	5	5	2	4	9	5	4	3	9	5	4	1	1	1	....	....	64
1	5	8	4	7	4	9	6	3	6	5	3	2	....	....	1	1	1	65
0	24	13	9	11	7	15	5	5	7	....	3	1	1	1	1	....	....	104
f	54	41	32	40	47	49	39	55	61	70	83	99	86	104	89	62	36	

TABLE 105.—*Variables: Beta score, test 4 × beta score, test 3. Group X: Special experimental group.*

BETA TEST 3.

BETA TEST 4.	0	1	2	3	4	5	6	7	8	9	10	11	12	*f*
30	1	....	....	....	....	1	....	....	....	3	4	2	9	20
28–29	....	....	....	....	....	....	....	....	1	....	2	2	4	9
26–27	....	....	....	....	....	....	....	....	....	....	4	5	9	18
24–25	....	....	....	....	1	....	2	1	....	6	11	12	8	41
22–23	....	1	....	1	....	1	1	1	1	4	9	11	19	49
20–21	1	....	....	....	1	8	2	1	4	8	23	18	16	82
18–19	1	....	1	1	2	4	4	2	8	13	21	14	10	81
16–17	1	1	2	1	5	10	4	10	11	14	30	15	13	117
14–15	1	3	6	6	14	7	9	6	8	26	25	11	7	129
12–13	5	5	4	4	[illegible]	6	7	5	15	15	16	7	1	93
10–11	5	6	10	7	5	10	7	5	12	16	9	5	....	97
8– 9	7	3	6	4	7	7	2	6	7	8	7	....	....	64
6– 7	4	10	10	7	....	7	8	[illegible]	4	2	1	1	....	62
4– 5	7	9	12	3	5	6	1	3	....	4	1	....	....	51
2– 3	12	14	[illegible]	4	3	4	....	....	1	3	....	....	....	50
0– 1	27	19	15	6	5	2	2	1	2	2	2	1	....	84
f	72	71	75	44	51	73	49	49	74	124	165	104	96	

TABLE 106.—*Variables: Beta score, test 3 × beta score, test 5. Group X: Special experimental group.*

BETA TEST 5.

BETA TEST 3.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	*f*
12	....	....	....	....	....	....	....	....	....	....	....	....	1	4	1	8	6	4	8	10	11	8	9	9	[illegible]	8	96
11	....	....	1	1	....	....	....	....	2	1	1	1	1	6	3	3	2	12	13	19	4	9	10	7	5	[illegible]	104
10	1	....	1	....	1	....	1	1	1	....	2	7	7	4	18	17	12	19	28	15	1	[illegible]	10	7	1	5	165
9	....	....	1	1	....	1	2	4	4	5	11	2	8	12	[illegible]	16	9	7	7	5	4	6	4	4	....	2	124
8	....	....	....	....	....	....	2	2	2	6	6	6	10	8	6	2	4	5	[illegible]	[illegible]	4	1	1	2	....	....	74
7	....	1	1	1	1	....	4	2	2	5	2	2	4	3	4	4	3	2	1	3	1	1	1	....	....	1	49
[illegible]	....	....	....	2	2	1	2	2	2	3	4	6	3	2	5	2	5	1	....	1	3	....	2	....	....	1	49
5	5	1	1	1	1	....	4	3	4	5	2	3	4	2	6	14	3	6	2	2	1	....	2	....	1	....	73
4	1	2	1	....	....	....	4	5	5	3	3	3	3	2	5	[illegible]	4	3	2	2	1	....	....	....	....	....	51
3	9	....	1	3	2	1	2	3	1	3	....	5	3	4	1	2	1	1	....	....	1	1	....	....	....	....	44
2	6	6	5	2	2	3	6	6	3	5	7	5	2	4	3	4	1	2	....	....	1	....	....	1	1	....	75
1	8	3	8	2	6	[illegible]	3	5	3	3	3	3	3	2	8	2	....	3	4	....	....	....	....	....	....	....	71
0	25	4	4	2	4	1	1	4	5	2	2	6	3	2	3	....	....	....	2	....	....	1	....	....	1	....	72
f	55	17	24	15	19	9	31	37	34	41	43	49	52	55	72	76	50	65	70	61	32	33	39	30	18	20	

TABLE 107.—*Variables: Beta score, test 3 × beta score, test 6. Group X: Special experimental group.*

BETA TEST 6.

BETA TEST 3.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	*f*
12	....	....	....	....	....	....	....	....	2	2	2	3	5	8	9	7	22	8	12	10	6	96
11	....	....	....	....	....	....	....	1	....	5	3	6	10	9	14	19	11	13	5	3	5	104
10	....	....	....	1	....	....	1	3	3	3	7	13	17	25	24	18	23	10	9	6	2	165
9	....	....	....	....	....	....	3	2	4	11	9	17	13	14	14	13	14	6	3	....	1	124
8	....	....	....	....	1	....	4	4	3	3	8	7	6	9	9	7	7	3	3	....	....	74
7	....	....	....	....	1	1	2	3	2	6	7	4	4	8	5	3	1	2	....	....	....	49
6	....	....	1	....	1	....	....	2	3	9	2	5	2	7	9	4	1	2	1	....	....	49
5	....	....	1	1	....	1	[illegible]	4	4	6	5	6	13	7	1	7	5	3	[illegible]	2	1	73
4	....	....	....	....	2	1	1	2	4	9	7	5	....	3	7	1	3	3	....	2	1	51
3	....	4	1	....	2	1	3	2	4	4	5	6	2	2	3	1	1	1	1	1	....	44
2	1	....	....	3	3	6	4	5	17	6	11	7	5	3	1	2	....	....	....	....	1	75
1	....	....	4	1	3	1	6	8	10	5	6	13	6	2	4	....	2	....	....	....	....	71
0	11	1	2	3	3	7	6	6	7	12	5	1	3	4	1	....	....	....	....	....	....	72
f	12	5	9	9	16	18	38	42	63	81	77	93	86	101	101	82	90	51	37	24	17	

TABLE 108.—*Variables: Beta score, test 7 × beta score, test 3. Group X: Special experimental group.*

BETA TEST 3.

BETA TEST 7.	0	1	2	3	4	5	6	7	8	9	10	11	12	*f*
10	1	....	....	1	3	3	....	....	8	10	29	27	23	105
9	2	2	....	2	2	7	5	5	2	8	28	20	19	102
8	2	....	1	2	3	5	....	3	10	9	24	9	8	76
7	1	3	3	1	5	5	5	5	10	18	22	13	15	106
6	6	2	4	5	8	7	7	11	4	18	20	11	10	113
5	4	5	8	9	8	6	6	[illegible]	12	23	19	15	13	137
4	2	7	11	6	4	12	8	2	6	21	15	2	3	99
3	7	4	13	5	4	6	5	5	9	8	4	3	3	76
2	4	9	8	3	6	8	6	2	6	6	2	3	1	64
1	8	16	13	6	1	8	5	3	2	1	1	....	1	65
0	35	23	14	4	7	6	2	4	5	2	1	1	....	104
f	72	71	75	44	51	73	49	49	74	124	165	104	96	

TABLE 109.—*Variables: Beta score, test 4 × beta score, test 5. Group X: Special experimental group.*

BETA TEST 5.

BETA TEST 4.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	*f*
30										1		1				1	1		1	1	1	2	3	3	3	2	20
28–29																		1	1		1	1	1	2	1	1	9
26–27															2				1	2	4	2	1	2	2	2	18
24–25								1						1	1	1	2	2	5	7	1	5	6	6		3	41
22–23													1	1	1	5	2	5	3	6	7	5	5	1	3	4	49
20–21				1					1	1			4	1	6	5	4	7	12	7	7	5	7	5	6	3	82
18–19								2		1	1	2	2	7	6	6	6	7	13	7	3	7	5	5	1		81
16–17			1	1			3			1	1	6	6	10	8	21	11	12	9	13	1	2	6		1	4	117
14–15	3			1		1	1	3	2	3	5	4	9	12	9	14	11	15	12	12	4	1	3	3		1	129
12–13	1		1	1	1			2		4	4	9	8	9	11	8	9	5	7	5		2	1	2			93
10–11	4		2		3	2	2	5	4	7	9	11	7	5	12	7	2	6	3		3		1	1	1		97
8– 9	2		3		1		8	5	5	6	9	4	8	3	6	1	1	1				1					64
6– 7	7	4	2	1	1	2	7	4	7	8	5	5	2	2	1	2	1			1							62
4– 5	5		4	3	2	2	3	11	6	4	6	2	1	1	1												51
2– 3	6	6	4	2	6		5	2	3	2	2	5		2	1	2		2									50
0– 1	27	7	7	5	5	2	2	3	5	3	1		4	1	4	3		2	3								84
f	55	17	24	15	19	9	31	37	34	41	43	49	52	55	72	76	50	65	70	61	32	33	39	30	18	20	

TABLE 110.—*Variables: Beta score, test 4 × beta score, test 6. Group X: Special experimental group.*

BETA TEST 6.

BETA TEST 4.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	*f*
30												1	1	1	1	3	3	1	2	2	5	20
28–29														1	1	4		2			1	9
26–27														2	1	4	2	2	5	1	1	18
24–25								1	1	2		3	3	5	5	6	6	6	1	2		41
22–23				1						2	2	2	5	4	9	3	8	3	6	2	2	49
20–21								1	1	2	1	6	8	7	10	8	19	7	6	6		82
18–19					1			1	2		3	6	9	12	10	12	13	8	3	1		81
16–17				1				3	3	5	8	9	11	12	19	11	13	5	8	5	4	117
14–15					2		3	1	4	8	10	16	15	16	15	14	8	13	1	8	2	129
12–13						1	1		2	8	5	10	12	15	12	8	11	1	4	1	2	93
10–11		1	1				7	3	9	8	14	12	6	13	9	5	4	3	1	1		97
8– 9					2	2	3	6	10	9	11	5	4	6	2	3	1					64
6– 7		1		1	1	2	8	4	6	13	5	10	5	4	1		1					62
4– 5		1		2	1	4	5	4	9	8	7	4	3		2							51
2– 3	2			1	4	2	1	11	6	5	8	3	3	2	4							50
0– 1	10	2	7	3	5	7	5	7	10	12	3	6	1	1	3	1	1					84
f	12	5	9	9	16	18	33	42	63	81	77	93	86	101	101	82	90	51	37	24	17	

TABLE 111.—*Variables: Beta score, test 7 × beta score, test 4. Group X: Special experimental group.*

BETA TEST 4.

BETA TEST 7.	0– 1	2– 3	4– 5	6– 7	8– 9	10–11	12–13	14–15	16–17	18–19	20–21	22–23	24–25	26–27	28–29	30	*f*
10		1	1	1	1	7	8	10	14	12	16	8	11	5	1	7	105
9				3	1	4	8	15	17	9	22	7	7	5	1	3	102
8	1	1	1		6	4	8	13	15	5	8	7	4	2		1	76
7	2	1		2	6	8	10	20	15	11	15	7	6			3	106
6	1	2	3	5	9	12	21	14	15	14	1	6	4	1	2	1	113
5	6	5	7	9	10	15	10	23	14	13	7	6	5	4	1	2	137
4	5	5	7	5	3	13	13	14	13	6	7	5	2	1			99
3	8	5	8	10	8	9	4	7	5	3	3	1	1		1	3	76
2	9	4	6	9	6	9	5	6	4	5		1					64
1	13	9	9	12	5	6	3	3	1	1	1	1			1		65
0	39	17	9	6	9	10	3	4	4	2			1				104
f	84	50	51	62	64	97	93	129	117	81	82	49	41	18	9	20	

TABLE 112.—*Variables: Beta score, test 6 × beta score, test 5. Group X: Special experimental group.*

BETA TEST 5.

BETA TEST 6.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	*f*
20											1				1	2	1	1	1	1	1	3	1		1	3	17
19												2		1	1	2	1		3	6	4			3		1	24
18										1		2	1	1	1	2	4	3	4	2	4	3	5	3	1		37
17				1							1	3	2	3	3		3	7	5	10	1	3	5	1	2	1	51
16	2					1		3		3	1	3	4	4	5	10	8	7	9	5	4	7	8	2	3	1	90
15	1							1		2	1	2	7	3	3	10	8	8	8	9	3	6	3	5	1	1	82
14	1						1	4		2	2	4	3	5	9	12	7	11	11	5	6	1	8	4		6	101
13	2			1		1	2	1	3	2	8	8	3	6	14	6	4	5	8	9	1	3	3	4	2	5	101
12			2	2		1	2	1	2	3	3	2	6	6	8	11	3	7	3	6	3	1	3	5	5	1	86
11	4		1		3		2	4	5	8	2	7	8	3	10	3	7	6	5	3	3	4	2	2	1		93
10	5	3	4	2	1	1	3	2	2	1	6	4	5	12	5	9	3		2	2	1	2		1	1		77
9	10		5	2	2	1	4	5	9	4	8	4	2	5	4	4		4	4	3	1						81
8	3	2	3	3	2	2	5	7	5	4	5	2	4	2	4	3	1	1	2				1		1	1	63
7	5	2	2		1		5	3	2	6	2	2	3	2	2	1		3	1								42
6	2	2	1	2	2		2	4	2	3	2	2	4	2	1	1			1								33
5	2	2		1	3	2	2	1	1	2	1	1															18
4	2	2	3		2		1	1	1									1	3								16
3	1	1			1		2		1			1			1			1									9
2	3	1	1	1	2				1																		9
1	3		1				1																				5
0	9	2	1																								12
f	55	17	24	15	19	9	31	37	34	41	43	49	52	55	72	76	50	65	70	61	32	33	39	30	18	20	

TABLE 113.—*Variables: Beta score, test 7 × beta score, test 5. Group X: Special experimental group.*

BETA TEST 5.

BETA TEST 7.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	*f*
10			1					1	1	3	2	4	5	7	5	8	3	5	12	14	6	7	1	6	4	2	105
9				1	1	1	1			3	2	1	5	5	4	9	6	9	14	12	5	1	5	3	2	6	102
8								1	2	1	5	2	6	3	4	9	5	9	9	3	3	8	5			1	76
7	2				1	1	3	3	1	3	3	5	6	3	10	10	8	5	9	9	4	5	3	6	3	3	106
6	3		1	1	1		2	6	4	3	4	7	3	12	7	11	9	7	11	5	4	1	3	3	4		113
5	3	3		3	1		4	10	6	5	6	6	7	6	8	10	6	9	3	9	6	5	8	7	3	3	137
4	2		2		1	2	3	1	5	5	5	7	8	5	10	7	6	9	2	7	2		3	3		4	99
3	5	1	4				6	4	4	6	8	1	3	4	8	4	3	5	2	2	1		1	2	1	1	76
2	6		3	2	6	1	3	2	1	3	5	6	4	3	7	4	1	2	2			1	1		1		64
1	9	3	6	6	4	2	3	5	1	6	1	4	3	2	1	1	2	2	3				1				65
0	25	10	6	2	4	2	6	3	9	3	2	6	2	5	8	3	1	3	3		1						104
f	55	17	24	15	19	9	31	37	34	41	43	49	52	55	72	76	50	65	70	61	32	33	39	30	18	20	

TABLE 114.—*Variables: Beta score, test 7 × beta score, test 6. Group X: Special experimental group.*

BETA TEST 6.

BETA TEST 7.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	*f*
10								2	1	5	3	4	10	11	10	8	18	13	8	8	4	105
9				1					1	1	2	4	11	15	15	13	16	8	4	5	6	102
8						1	1	2		3	9	3	5	6	13	9	10	6	4	3	2	76
7					1		1	3	3	3	5	10	10	11	13	15	10	7	7	4	3	106
6			1				2	3	6	14	5	16	10	13	16	10	8	3	5	1		113
5		1			1	1	4	5	6	11	13	16	12	16	16	12	10	6	5	2		137
4				1		3	3	3	5	9	6	15	15	13	5	6	8	4	2	1		99
3		2	1		1	2	3	9	8	8	8	3	5	6	4	5	7	2	1		1	76
2			2	2	2	3	3	4	7	9	8	8	3	4	3	2	1	2	1			64
1	2	1	2	2	3	2	7	5	9	7	3	9	3	3	3		2		1		1	65
0	10	1	3	3	8	6	9	6	17	11	15	5	2	3	3	2						104
f	12	5	9	9	16	18	33	42	63	81	77	93	86	101	101	82	90	51	37	24	17	

TABLE 115.—*Variables: Alpha score, test 1 × alpha total score. Group X: Special experimental group.*

ALPHA TOTAL.

ALPHA TEST 1.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–119	120–124	125–129	130–134	135–139	140–144	145–149	150–154	155–159	160–164	165–169	170–174	175–179	180–184	185–189	*f*
12																				1	1	1		3	1	1		1				1		1	1				12
11																		1	2	2	1	1		1		2		2	1	1	1	1	2	3	1	1	1	2	28
10														1	3		4	2	3	7		6	2	3	3	5	3	2	2	2	1	1						1	52
9									1		2		1	2	1	2	4	3	4	7	7	3	3	3	1	7	2	4	2	2	1	2		2					67
8						2	8	3	2	2	1	3	7	6	3	4	4	5	3	7	1	3	3	3	6	3	3	3		1	3		1						82
7			1	1	2		5	3	3	3	4	6	5	8	5	8	7	5	6	5	5	1	1	4	1		1	1	2				1						94
6			1	1	1	5	1	8	5	7	12	9	8	6	10	6	12	10	5	5	4	4	1	1	1	3				1	1								131
5		2	3	4	9	5	10	16	13	11	5	3	6	9	7	4	5	2	1		1	1		2				1		1									121
4	1	4	5	4	6	9	10	7	5	6	4	8	8	5	7	1	3	3	1	2			1																100
3	1	9	7	1	12	11	10	9	8	10	3	6	10	1	4					3						1													116
2	1	12	15	9	11	8	10	1	1	2	1	4	1	1	1	1				1		1																	93
1	22	11	6	10	6	9	2	3	4		2			1						1		1																	78
0	39	10	6		8	3	3	1	2			1																											73
f	70	18	14	33	55	50	56	55	46	42	37	40	16	40	11	26	13	31	25	11	20	22	13	20	14	21	10	13	9	7	6	5	4	7	2	1	1	3	

TABLE 116.—*Variables: Alpha score, test 2 × alpha total score. Group X: Special experimental group.*

ALPHA TOTAL.

ALPHA TEST 2.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–119	120–124	125–129	130–134	135–139	140–144	145–149	150–154	155–159	160–164	165–169	170–174	175–179	180–184	185–189	f
20																																							
19																																							
18																																		1	1	1	2	5	
17																													1									2	
16																								3			1	1	2		1	1	1	1	2				13	
15												1	1							1	1		1		1		3	1	1		2			3					16	
14																2				1	4	3		1	1	2		2	1	3		1		1					22	
13											1						1		6	1	1	2		2	3	2	3	1	1		1	3		1					29	
12													2		2	2	7	2	2	2	3	3	3	4	3	5	1	5	1	2	1		2				1		53	
11										1		2	6	2	2	2	7	2	16	9	5	3	8	3	5		3	1		1									81	
10									2	3	2	3	6	7	4	10	3	10	3	7	5		3	2	1	1	2	1											76	
9				1	1	2	2	5	5	4	6	5	8	6	8	5	10	10	2	3	2	4	2			2				2									95	
8			1	2		5	6	3	8	7	7	9	11	10	7	6	6	4	4	6	1	1	1	1															106	
7		1	1	1	6	9	7	7	10	9	11	8	9	5	2	1	2	1	1	2			1																94	
6		1	2	5	7	13	8	10	6	10	5	1	6	3	5	3	3		1	1	3					2		1											95	
5		3	5	3	8	4	11	12	7	3	3	5	1	2	5	1	1	1		1		1																	77	
4		4	6	3	13	7	10	8	5	5		2	2	1	2	1	1																						70	
3	1	4	13	8	9	4	9	5	1		1	1	1	1																									58	
2	6	11	10	6	8	5	2	2	1																														51	
1	19	14	2	1		1	1																																38	
0	44	10	4	3	3			1		1																													66	
f	70	48	44	33	55	50	56	55	46	42	37	40	46	40	41	26	43	31	25	41	20	22	13	20	14	21	10	13	9	7	6	5	4	7	2	1	1	3	

TABLE 117.—*Variables: Alpha score, test 3 × alpha total score. Group X: Special experimental group.*

ALPHA TOTAL.

ALPHA TEST 3.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–119	120–124	125–129	130–134	135–139	140–144	145–149	150–154	155–159	160–164	165–169	170–174	175–179	180–184	185–189	f
16																														1				1					2
15																			1					2	1		1	1		1	2	1	2					1	13
14																1		1							1	2	2	1	1	1			1	1	1					13
13									1								1	1	1	2					3	2	2	1	2	1	2			2	1				26
12													1	1				2	3	1	2		3	1	2	1	3	4		1				1					29
11													1		1	2	3	2	4	1	2	2	2	2	2	5	1	1	1		1	1		2				1	37
10										1	2	1	1	1	4	6	2	4	8		4	2	4	1	2		3	1	1	2	1	1				1			54
9							1	1	1	4	2	6	2	4	4	2	6	9	2	7	5	6	5	2	3	2	1	1				1							77
8					1			3	2	3	3	7	8	9	12	6	10	5	2	9	4	4	4	1	3	1			1	1									103
7					5	1	4	6	4	5	7	8	13	12	9	4	11	8	4	8	5		2	1		1	1					1							120
6					3	4	5	8	11	4	7	5	9	5	7	3	4	1	3	3		2		1															85
5			1		4	7	8	12	8	11	7	7	4	2	2	3	1	1	2		1	1												1					82
4			1	2	7	7	9	11	8	5	7	4	5	6	1	1		1																					75
3		2	2	4	4	8	13	7	8	6				2		2																							58
2	1	5	6	6	9	7	6	3	2	3		1																											49
1	8	7	15	6	9	7	5	1	1		1									1																			61
0	61	34	19	15	13	9	5	3			1	1			1							1																	163
f	70	48	44	33	55	50	56	55	46	42	37	40	46	40	41	26	43	31	25	41	20	22	13	20	14	21	10	13	9	7	6	5	4	7	2	1	1	3	

TABLE 118.—*Variables: Alpha score, test 4 × alpha total score. Group X: Special experimental group.*

ALPHA TOTAL.

ALPHA TEST 4.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–119	120–124	125–129	130–134	135–139	140–144	145–149	150–154	155–159	160–164	165–169	170–174	175–179	180–184	185–189	f
40																																					1	1	
38–39																																			1	1		2	
36–37																														1								1	
34–35																																1						1	
32–33																								1						1				2		1			5
30–31																													2	2	2	1	4	1	2	1			15
28–29																							1				2	1	1	1	1	1	1	2				1	12
26–27																								1	3	1	5		2		2		1	1					15
24–25																		1					4	2	2	6	3	1	3	2	1	2		2					29
22–23																		2	1	2	5	1		1	3	2	3	1	2	1								1	25
20–21																		1	1	2	7		3	3	7		2	3	2	1		1							33
18–19															1	1	1	6	2	4	6	5	3	1	1	3	5	1	1			1							42
16–17												1		2	1	5	5	3	8	3	7	5	3	2	2	1	1	1			1								54
14–15													2	4	5	3	5	6	6	6	6	3	4			1		1											56
12–13													3	5	7	4	8	3	7	1	2	1	1	2	2				2										49
10–11								1			1	3	5	6	9	6	2	2	7	4	1	4	1	2															54
8–9										1	2	4	6	2	5	7	3	9	4	1	2	1	1																49
6–7							7	4	6	11	6	6	6	6	6	7	1	2	2	3	3	2	1																73
4–5			1	2	1	1	1	11	9	5	7	5	3	6	6	4	1				1	1																	64
2–3		1	4	4	10	10	10	9	8	4	3	3	2	2	1			2	1																				74
0–1	70	47	39	27	44	41	30	29	17	15	13	10	3	2	5	1	3	2	1	1	1	1						1											393
f	70	48	44	33	55	50	56	55	46	42	37	40	46	40	41	26	43	31	25	41	20	22	13	20	14	21	10	13	9	7	6	5	4	7	2	1	1	3	

TABLE 119.—*Variables: Alpha score, test 5 × alpha total score. Group X: Special experimental group.*

ALPHA TOTAL.

ALPHA TEST 5.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–119	120–124	125–129	130–134	135–139	140–144	145–149	150–154	155–159	160–164	165–169	170–174	175–179	180–184	185–189	f
24																											1				1	1	1					1	5
23																											1		1			1		1					4
22																				1				1						1		1	2	3		1		1	11
21																								1		1		2						2	1				7
20											1										1	1		1			2	2	1	1	3			1			1		15
19																	1			1	1			2	1	1	1	1							1				10
18																						1		1	1	2	1	3	1	2	1	1	1						15
17																	1			1		1			2	1	1	2	3									1	13
16											1						1	1		1	1	2	1	2	2	5		2	3			1							23
15												1		1	2		3	2	1	4	1	2	4	4	3	2				1									31
14											1				1	2	4	2	7	3	2	2	1	2	2	3	1			1									34
13									1			1		1	2	4	5	4	2	5		3	2	3	1			1											35
12										1	2	1	1	5	1	4	3	4	3	6	5	1	2	1	2	3				1									50
11										1	3	4	2	3	6	4	1	5	2	5	2	4		2	1		1	1											49
10				1					2	1	2	1	2	3	4	5	4	5	4	1		2	1	1		2					1								47
9					1	1		3	2	1	4	2	3	4	6		4	1	3	3	3	2																	43
8					2	2	2		6	2	3	5	6	7	5	2	3	5	1	6	1	1																	59
7					2	1	2	6	5	3	3	3	2	4	3	1	2	2		1	1	1																	42
6		1		2	6	3	2	6	2	2	6	2	7	6	4	1		1		1																			52
5		1	3	1	3	1	5	7	8	2	1	5	6	1		2	2	1	1																				50
4		1	4	3	4	10	9	4	4	6	3	4	3	1	2		3	1																					62
3	1	3	5	2	7	9	4	7		2		2	1	1	2																								46
2		5	6	8	6	6	5	4	5	1	2	3		1			1	1																					54
1	3	4	4	1	4	5	7	4	3	6	1	1	1							2																			46
0	66	33	22	15	20	12	16	12	7	11	4	5	4	2	2	4	1		1	3		3					1												244
f	70	48	44	33	55	50	56	55	46	42	37	40	46	40	41	26	43	31	25	41	20	22	13	20	14	21	10	13	9	7	6	5	4	7	2	1	1	3	

TABLE 120.—*Variables: Alpha score, test 6 × alpha total score. Group X: Special experimental group.*

ALPHA TOTAL.

ALPHA TEST 6.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–119	120–124	125–129	130–134	135–139	140–144	145–149	150–154	155–159	160–164	165–169	170–174	175–179	180–184	185–189	f
20																																							
19																																							
18																						1																	1
17																							1		1	1	1										1		5
16															1															2							1		4
15																				1	2			1		1				1	1	1		1				1	10
14																	1	1		1				1		1					1		1	2					10
13																	2	1		1	1	3		1		2		2	1		1		1	1					18
12							1									3		1	1	1	1	6	1	3	1	4		2		3	2	2		2		1			37
11										1				4	2	2	1	6	4	3	5	3	2	1	2	4	2	4	2	2		1	1		2				57
10											1	2	2	2	1	3	5	6	3	7	9	3	4	3	4	4	2	3	4	1		1	1					1	78
9									2	2	2	3	3	4	9	1	2	5	7	5	8	4	2	3	5	1	4			1		1		1					89
8						1	2	1	5	5	2	4	7	4	4	6	3	2	3	5	1			1	3	2	2	3											66
7					5	3	7	5	1	5	7	5	5	3	6	4	6	3	2	4	3					1		1		1									77
6			2	1	1	5	7	4	4	5	3	8	4	4	8	1	1	4	1	2		3						1											69
5			2	4	8	7	10	8	7	7	4	6	6	5	2	1	2	1	1		1					1													83
4					1	9	7	8	2	6	3	3	3	3	3		0	1	1																				52
3		2	1	4	10	6	6	5	7	1	5	2	1	2	1	2	2	1		1					1														59
2		4	11	6	6	5	4	10	3	4	2	2	1		1		1	1																					64
1	5	9	12	8	13	6	5	7	9	3	2	1	1	1	4	1	2	1		1																			91
0	63	33	16	10	12	7	6	5	5	2	4	4	3		1		2		1	2						1													177
f	70	48	44	33	56	50	56	56	46	42	37	40	46	40	41	26	42	31	25	41	20	22	13	20	14	21	10	13	9	7	6	5	4	7	2	1	1	3	

TABLE 121.—*Variables: Alpha score, test 7 × alpha total score. Group X: Special experimental group.*

ALPHA TOTAL.

ALPHA TEST 7.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–119	120–124	125–129	130–134	135–139	140–144	145–149	150–154	155–159	160–164	165–169	170–174	175–179	180–184	185–189	f
40																																							
38–39																																				1			1
36–37																										1								2					4
34–35																												1		1		1	1	1					5
32–33																		1				1					1	1			2	2	1						9
30–31																					1					1					1	1					1	2	7
28–29																				1	1					2		2	2	2		1	1						12
26–27																							1				1		1	1	1		1	2	1				9
24–25																1			1					2		1	2	1	2		1			2					13
22–23																1					2	1	3	2	1	4		4	1										19
20–21																				1	3	2	1		2	1	3	1	1	1		1	1						18
18–19															1			1	1		3	2	2	1	1	1	3		1	1									18
16–17											1		1						3	2	4		1	2	1				1		1	1							18
14–15													1			4	2	5	3	1	3	1	3	3	2	4		1	3										40
12–13									2		3	1		3	4	3	2	5	1	1	4	4	2	5	1	2	1	1	1	1									52
10–11								1	1	1	3	1	5	5	5	3	5	6	2	6	5		1	2	2	1	2												57
8– 9					1		1	1	4	4	7	6	6	7	7	11	4	5	5	6	9	4	2		3		1												94
6– 7			1	3	2	1	6	4	6	9	4	4	6	9	7	5	9	10	3	4	1	1		1	1		1												98
4– 5		1	1	2	8	9	14	16	11	5	8	8	12	6	7	3	7	2	1	3		2		1															127
2– 3		6	10	8	15	18	18	19	13	7	10	8	8	6	2	3	5	1	2	1	1	1																	162
0– 1	70	41	32	19	30	21	16	9	11	7	7	7	4	2	2		1			1		1	1																284
f	70	48	44	33	55	50	56	55	46	42	37	40	46	40	41	26	43	31	25	41	20	22	15	20	12	21	10	13	9	7	6	5	4	7	2	1	1	3	

TABLE 122.—*Variables: Alpha score, test 8 × alpha total score. Group X: Special experimental group.*

ALPHA TOTAL.

ALPHA TEST 8.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–119	120–124	125–129	130–134	135–139	140–144	145–149	150–154	155–159	160–164	165–169	170–174	175–179	180–184	185–189	f
40																																							
38–39																														1				2				1	4
36–37																								1	1		1			1	2	1		1	1			1	10
34–35																	1					1				2			2	1	2		2	1	1	1		15
32–33																			1		1	2	1	2	2	2		2	1	2	1	1	2	1					21
30–31																	1			4		1	2	4	2	4	2	2			2								24
28–29																1	2	2	1	3	4	3	1	3	2	3	2	4	3			1		1					36
26–27															1	2	2		1	3	2	2	2	4	2	4	2	1	3	2	1								34
24–25													1		2	1	4	5	8	10	2	1		4	1	2	2	1											44
22–23											1	1	3	3	2		4	1		4	2	3	2	2	2	3	1	2										1	37
20–21									1			1	1	2	7	2	1	10	4	5	2	3	2		1			1											46
18–19									2	4	4	5	3	6	9	6	6	4	3	2	2	2	1		1	1													61
16–17								1		4	3	6	7	4	6	7	6	8	4	3	6	2	1	1															69
14–15								1	2	2	3	5	4	8	5	5	5	5	3	2	2	2	1	1															56
12–13							1	8	7	3	7	7	7	9	7	4	2	2	1	1	1	1																	68
10–11					3	6	6	12	15	6	3	6	7	10	4	2	1	3					1																82
8– 9			1	2	6	9	4	9	8	7	3	1	5	4	1		2																						63
6– 7		1		5	13	15	18	13	8	7	3	3	2	3	1			1	1																				94
4– 5		1	6	11	12	9	13	8	3	3	1	2																											69
2– 3	1	3	13	8	14	7	4	3												1		1																	55
0– 1	69	43	24	7	7	3	1	1		2		2																											159
f	70	48	44	33	55	50	56	55	46	42	37	40	46	40	41	26	43	31	25	41	20	22	13	20	14	21	10	13	9	7	6	5	4	7	2	1	1	3	

TABLE 123.—*Variables: Beta score, test 1 × alpha total score. Group X: Special experimental group.*

ALPHA TOTAL.

BETA TEST 1.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–119	120–124	125–129	130–134	135–139	140–144	145–149	150–154	155–159	160–164	165–169	170–174	175–179	180–184	185–189	f
10	1	2			1	1	4	2		4		1	5	5	4	1	4	7	3	7	4	4		4	1	6	3	5	2	2	1	2	2	4			1	2	95
9	2			3	2	2	5	7	6	4	3	7	7	5	4	8	9	8	4	11	4	6	5	5	3	3	2	2	3	1	3				1				138
8	7	9	6	4	4	9	8	15	8	8	13	9	12	16	11	6	12	4	10	6	3	5	3	5	5	4	2	2	1	2	2	1	2	1	2			1	218
7	6	5	9	5	17	11	7	6	11	10	7	7	5	9	10	6	6	6	2	4	2	3	2	1	4	3	2	3	3	1		1		2					176
6	8	4	8	4	9	9	13	9	6	6	5	1	8	2	3	2	6	4	3	3	5	1	2	3		2	1	1		1		1							130
5	11	5	5	4	6	2	7	4	8	2	4	5	1	1	2	3	3	1	2	4	1	2		1		1													85
4	12	10	5	4	7	4	4	4	4	2	1	6	2	1			1	1		2	1			1	1	1	1												75
3	9	3	4	3	3	5	4	3		4	1	2	1		3						1		1				1												48
2	4	5	4	5	2	3	1	2	1	1	2	1	3	1	3			2		1																			41
1	2	2	3	1	3	1	1	2	2	1	1	1	1		1																								22
0	8	3			1	3	2	1																															19
f	70	48	44	33	55	50	56	55	46	42	37	40	46	40	41	26	43	31	25	41	20	22	13	20	14	21	10	13	9	7	6	5	4	7	2	1	1	3	

TABLE 124.—*Variables: Beta score, test 2 × alpha total score. Group X: Special experimental group.*

ALPHA TOTAL.

BETA TEST 2.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–119	120–124	125–129	130–134	135–139	140–144	145–149	150–154	155–159	160–164	165–169	170–174	175–179	180–184	185–189	f
16									1		1	2		1	1	3	3	1	2	4	2	1	3	1	2		3					1	1	1		1	1		36
15		1					1	1	1	3	1	2	4	3	3	5	5	3	2	3	1	2		2	3	4	2	3	2	2	1	2							62
14				2	1	1	4		3	1	2		3	6	5	4	5	5	4	6	3	3	1	3	3	2	1	6	2	2	2		2	2				2	89
13				2	2	1	2	4	4	4	4	6	4	10	4	2	7	4	5	5	4	3	2	6		5	3	1		2	2	1	1	2	1			1	104
12		1	1	2	4	4	3	4	5	2	5	6	6	4	5	5	5	3	2	4	2	1	1	2	1	2			2	1				2	1				86
11			2	2	5	5	7	4	5	5	2	5	7	4	7	2	7	5	5	9	2	1	1		2	2	1		2										99
10	4	2	4	2	3	5	6	3	5	7	4	2	9	5	1	4	1	2	2	3			1	4		1	1			1		1							83
9		5	2	4	5	4	5	6	5	4	2	5	1	2	5	1	2		1	3	2	2				1	1					1							70
8	2	5	4	3	4	6	6	2	7	2	3		3	3	3		2		1	1		2	1		1													61
7	4	4	3	2	6	1	4	5	1	3	5	3	1			1	2	1	1	2	1	1			1													55
6	5	2	5	2	3	4		5		3	2	3	2		1	1		1																					39
5	10	5	5	4	6	3	3	5			2	2	1	1	2																								49
4	7	2	2	1	8	1	6	4	2	1	1	2			2			2	1	2	1	1	1																47
3	6	3	3	4	3	1	1	3	1	2		1	1	1			2			1		3																	40
2	7	4	3		3	1	5	1	2	1	1	1					1									1													32
1	12	3	6	2	1	3	3	1	1	2	2			1	1			1					1				1												41
0	13	11	2	2	3	3	4	3	4	1	1	1	1				1	1				1			1	1													54
f	70	48	44	33	55	50	56	55	46	42	37	40	46	40	41	26	43	31	25	41	20	22	13	20	14	21	10	13	9	7	6	5	4	7	2	1	1	3	

TABLE 125.—*Variables: Beta score, test 3 × alpha total score. Group X: Special experimental group.*

ALPHA TOTAL.

BETA TEST 3.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–119	120–124	125–129	130–134	135–139	140–144	145–149	150–154	155–159	160–164	165–169	170–174	175–179	180–184	185–189	f
12	...	...	...	...	...	...	1	...	3	2	...	...	5	1	3	...	8	3	1	8	8	6	4	3	4	6	3	3	4	3	4	3	2	3	1	1	1	2	96
11	...	...	...	1	...	...	2	1	3	...	3	5	1	8	3	5	7	6	4	8	8	3	5	10	6	2	4	3	3	1	1	2	8	...	...	...	...	...	104
10	...	...	...	1	1	3	6	5	5	8	8	5	8	9	7	12	12	8	12	15	3	5	3	5	1	8	2	7	1	1	...	1	...	1	1	...	...	1	165
9	...	1	1	3	5	4	12	11	7	8	5	6	9	9	11	3	5	4	2	5	5	1	...	...	1	3	1	...	...	...	1	...	...	1	...	...	...	...	124
8	1	2	4	2	5	5	5	4	6	6	5	2	4	5	4	...	1	4	8	2	...	2	...	2	1	...	...	...	...	...	...	...	...	...	...	...	...	...	74
7	1	3	5	2	6	6	2	4	...	3	2	2	4	1	2	3	1	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	49
6	1	...	3	3	5	8	4	3	1	3	1	2	5	3	1	1	2	3	1	...	...	2	1	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	49
5	3	2	3	6	5	7	2	7	4	6	3	6	3	8	4	...	2	...	2	1	2	8	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	73
4	4	1	4	3	5	5	4	6	5	1	1	5	4	1	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	51
3	6	6	3	...	...	1	5	5	3	2	3	2	2	...	2	1	1	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	44
2	12	10	11	6	10	8	5	4	4	1	1	1	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	75
1	17	9	7	3	7	2	3	4	5	1	4	3	1	...	1	1	1	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	71
0	25	14	3	3	6	7	5	1	...	1	1	1	...	...	1	...	2	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	72
f	70	48	44	33	55	50	56	55	46	42	37	40	46	40	41	26	43	31	25	41	20	22	13	20	14	21	10	13	9	7	6	5	4	7	2	1	1	3	

TABLE 126.—*Variables: Beta score, test 4 × alpha total score. Group X: Special experimental group.*

ALPHA TOTAL.

BETA TEST 4.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–119	120–124	125–129	130–134	135–139	140–144	145–149	150–154	155–159	160–164	165–169	170–174	175–179	180–184	185–189	f
30	...	...	...	...	1	...	...	...	...	...	...	...	1	1	...	1	1	...	1	1	...	...	...	1	1	1	2	1	...	1	1	2	...	2	...	...	1	20
28–29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2	...	1	...	...	1	...	...	...	...	1	...	...	1	...	...	...	...	1	...	...	...	...	9
26–27	...	...	...	...	...	...	...	...	...	1	...	...	...	...	1	...	...	1	...	2	...	1	...	...	1	1	1	2	1	1	...	...	1	...	...	1	1	18
24–25	...	...	...	...	1	...	...	...	1	1	...	...	2	4	1	2	1	4	5	2	...	4	1	...	2	4	1	2	...	...	2	...	...	1	...	...	...	41
22–23	...	...	...	...	...	...	...	1	...	1	...	3	2	1	3	2	6	2	...	5	2	3	1	4	...	2	2	1	2	2	1	...	1	1	...	...	...	49
20–21	...	...	...	...	1	...	1	...	...	1	...	2	3	7	3	1	2	2	3	13	7	6	2	9	2	5	2	1	2	1	...	1	1	3	...	...	1	82
18–19	...	...	...	...	1	2	2	3	5	4	4	9	5	4	5	3	6	5	4	4	4	1	1	1	2	1	...	2	1	1	...	1	...	...	...	...	...	81
16–17	...	...	3	2	2	3	6	6	5	5	9	5	4	8	6	6	8	5	2	6	4	5	2	3	1	2	2	...	3	...	2	1	1	...	...	...	...	117
14–15	2	1	1	6	3	8	7	9	8	9	6	3	14	5	6	5	7	6	7	6	1	...	3	1	2	2	...	1	...	...	...	...	...	...	1	...	...	129
12–13	...	2	3	2	1	4	12	5	10	7	7	5	6	3	5	3	6	3	1	1	1	...	1	1	1	1	...	2	...	...	...	...	...	...	...	...	...	93
10–11	1	2	3	2	13	8	10	11	8	4	5	4	6	3	3	5	1	2	...	...	...	...	...	...	1	1	...	...	...	...	...	...	...	...	...	...	...	97
8–9	2	3	4	9	8	10	4	5	4	5	...	2	1	1	4	...	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	64
6–7	8	7	12	3	5	2	5	4	1	2	3	5	1	2	1	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	62
4–5	12	8	5	4	4	7	3	7	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	51
2–3	15	10	7	1	7	2	3	1	3	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	50
0–1	30	14	6	3	9	4	3	3	1	2	1	2	1	1	1	...	...	1	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	84
f	70	48	44	33	55	50	56	55	46	42	37	40	46	40	41	26	43	31	25	41	20	22	13	20	14	21	10	13	9	7	6	5	4	7	2	1	1	3	

TABLE 127.—*Variables: Beta score, test 5 × alpha total score. Group X: Special experimental group.*

ALPHA TOTAL.

BETA TEST 5.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–119	120–124	125–129	130–134	135–139	140–144	145–149	150–154	155–159	160–164	165–169	170–174	175–179	180–184	185–189	f
25	...	...	...	...	...	...	1	...	...	...	...	1	1	1	...	...	1	...	4	2	...	1	...	1	2	2	1	...	1	...	1	...	...	...	...	...	...	20
24	...	...	...	...	...	...	...	1	1	...	1	...	1	...	1	...	...	1	2	3	...	1	...	1	1	1	1	1	...	1	1	...	...	...	...	...	1	18
23	...	...	...	...	...	...	...	...	1	3	...	1	2	1	2	1	3	1	1	2	1	1	1	1	1	1	3	3	...	...	...	...	...	...	...	...	...	30
22	...	...	...	...	...	...	...	1	1	2	1	1	...	4	2	1	1	3	1	2	...	1	1	3	...	2	2	1	...	1	3	1	...	3	1	...	...	39
21	...	...	...	...	...	...	...	1	...	1	...	2	1	1	3	3	...	1	2	3	2	...	1	1	3	1	...	...	...	1	...	1	1	1	1	...	1	33
20	...	...	...	...	...	...	1	...	1	...	1	...	4	1	2	2	2	1	...	1	...	3	...	2	1	2	...	2	2	2	1	...	...	1	...	...	...	32
19	...	...	...	...	...	...	1	2	...	2	1	...	7	7	2	...	5	4	3	2	1	5	3	5	1	3	...	1	2	...	1	...	1	2	...	...	...	61
18	...	...	...	1	1	1	...	...	4	5	3	5	5	5	2	3	5	5	2	3	5	1	2	1	1	5	1	...	1	1	...	1	1	...	...	...	...	79
17	...	...	2	1	2	1	4	6	2	1	3	...	2	5	3	3	5	1	6	2	3	2	2	...	2	1	2	2	1	...	1	...	...	...	...	1	...	...	65
16	...	...	...	1	1	2	3	1	1	2	3	6	5	2	2	2	2	2	3	5	...	1	...	2	2	...	...	...	...	...	...	...	...	...	...	...	...	...	50
15	...	...	...	1	2	5	4	6	8	3	4	6	3	2	4	2	7	2	1	3	2	2	1	2	...	2	1	1	1	...	...	...	...	...	...	...	1	...	76
14	...	...	...	3	5	6	7	3	5	4	2	4	4	3	3	6	4	3	2	3	...	2	1	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	72
13	...	1	1	1	2	2	6	3	6	4	5	1	5	3	3	1	2	3	3	2	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	55
12	...	1	3	...	4	8	7	6	4	3	1	2	1	1	1	1	2	...	...	5	1	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	52
11	2	6	2	...	4	6	3	3	3	1	2	2	2	4	...	2	...	1	...	1	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	49
10	...	2	1	3	6	6	4	7	1	3	2	1	1	1	1	...	2	1	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	43
9	...	2	6	6	4	3	3	2	3	2	5	2	...	1	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	41
8	4	4	6	2	6	1	2	1	...	2	1	1	...	...	2	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	34
7	4	5	5	1	6	2	4	2	1	...	1	4	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	37
6	6	3	3	7	3	1	1	2	2	...	...	2	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	31
5	2	...	1	1	1	...	...	2	...	2	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9
4	4	4	5	...	2	2	...	...	...	...	...	...	1	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	19
3	7	2	1	...	...	...	...	1	...	...	1	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	15
2	7	3	3	3	1	1	1	...	...	...	1	...	1	...	1	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	24
1	10	4	1	...	1	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	17
0	24	11	4	2	3	3	3	4	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	55
f	70	48	44	33	55	50	56	55	46	42	37	40	46	40	41	26	43	31	25	41	20	22	13	20	14	21	10	13	9	7	6	5	4	7	2	1	1	3	

Table 128.—*Variables: Beta score, test 6 × alpha total score. Group X: Special experimental group.*

ALPHA TOTAL.

BETA TEST 6.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–119	120–124	125–129	130–134	135–139	140–144	145–149	150–154	155–159	160–164	165–169	170–174	175–179	180–184	185–189	f
20											1	2			1	1		1					1			1		2		1		1	1	2				1	17
19							1					1	4		1			2	2		1	4		3				2	1		1		1						24
18											2	1	2		1		2	4		1	2	1	2	2	2	5		2	1		1			1	1		1		37
17					2	1			2	3	4	2	1	2	3	3	3	2	1	3	1	2	2	3	2		1	2	1	2		2				1			51
16				2		1	5	3	3	1		3	5	8	5	2	7	6	2	7	4	3	2	4		4	1		2	2	2	1	1	2					2	90
15						2	4	3	3	9	3	1	4	6	5	3	5	3	4	6	6	3	3	3	3	1	2	1		1	1								82
14				1	4	4	5	3	7		5	5	5	4	6	5	6	8	3	5	3	1	2	3	4	4	1	2	3	1	1								101
13		3	2	3	3	4	6	7	4	4	4	5	6	7	5	3	6	3	5	6	2	1		2	1	1	4	1				1	1	1					101
12	2	3	1		6	3	4	9	8	4	5	6	4	4	3	2	5	2		5	2	2			1	2	1	1					1						86
11	3	5	5	6	6	6	6	4	6	3	9	6	5	3	6	4	1		4	2	1	1	1			2													93
10	3	6	3	3	6	11	4	8	2	4	3	2	7	1	2		4	1		3	1				1														77
9	6	7	6	6	8	7	8	6	7	3	1		3	2	2	1	1	1	2				1	1			1			1									81
8	13	4	9	4	7	5	5	5	1	2	1	2	1	2	1			2	1																				63
7	5	3	3	4	6	3	7	3		2		2					1					2																	42
6	6	6	5	2	2	2	1	3	2	2		1			1																								33
5	5	3	3	2	2	1				2																													18
4	8	1	2	1	1				1		1			1																									16
3	4	2	1	1																1																			9
2	5		2		2																																		9
1	2	1							1											1																			5
0	8	4																																					12
f	70	48	44	33	55	50	56	55	46	42	37	40	46	40	41	26	43	31	25	41	20	22	13	20	14	21	10	13	9	7	6	5	4	7	2	1	1	3	

Table 129.—*Variables: Beta score, test 7 × alpha total score. Group X: Special experimental group.*

ALPHA TOTAL.

BETA TEST 7.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–119	120–124	125–129	130–134	135–139	140–144	145–149	150–154	155–159	160–164	165–169	170–174	175–179	180–184	185–189	
10				1	1	2	2	2	3	3	2	4	4	5	5	2	8	4	4	6	5	5	2	4	3	2	1	6	1	3	4	4	2	2	1		1	1	105
9		1		1	2	2	2	3	2	3	4	3	3	7	5	3	5	5	3	11	1	3	2	5	2	6	2	3	5	1			2	3	1			1	102
8		2	2	1	2	3	2	5	1	3	3		4	4	4	6	3	6	4	7	2		3	1	2	2	1			1						1		1	76
7	1	2	1	4	1	1	7	6	3	6	6	7	4	2	3	5	8	4	3	6	4	2	2	3	2	5	3		1	1	1	1		1					106
6	2	1	2	3	5	5	14	4	12	3	4	6	10	4	6	3	9	2	1	2	2	1	1	1	2	3	1	3	1										113
5	5	4	5	1	5	11	6	8	8	6	3	10	7	8	5	2	3	6	8	6	2	7		4		2	1	1	1	1									137
4	3	5	2	6	10	4	6	7	7	5	5	4	7	6	4	4	5	2	1	2	1		1	1									1						99
3	7	4	4	5	6	7	4	6	2	4	2	1	5	3	5	1		2		1	3		2	1	1														76
2	5	5	8	2	8	8	9	4	1	4	3	2										3	1				1												64
1	16	8	8	5	7	3	2	2	2	1	3	2	2		1		1		1											1									65
0	31	16	12	4	8	4	2	8	5	4	2	1		1	2		1					1			1	1													104
f	70	48	44	33	55	50	56	55	46	42	37	40	46	40	41	26	43	31	25	41	20	22	13	20	14	21	10	13	9	7	6	5	4	7	2	1	1	3	

Table 130.—*Variables: Alpha score, test 1 × beta total score. Group X: Special experimental group.*

BETA TOTAL.

ALPHA TEST 1.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–118	f
12																	1	4	3	3		1			12
11									1						1	1		5	5	5	6	2	2		28
10										2	1			3	2	5	9	10	6	9	2		2	1	52
9											1	1	2	5	4	7	9	11	12	7	3	3	2		67
8												2	2	4	5	8	19	7	14	6	11	2			82
7							1	2	1	3		8	2	8	9	11	8	12	10	10	8	1			94
6					1	1		1	5	1	4	9	8	17	14	12	16	13	19	8	2	4		1	131
5				1		1	4	3	7	9	6	9	11	12	9	13	13	13	5	2	2		1		121
4						4	6	2	5	6	7	6	10	10	5	15	7	5	5	2	2	3			100
3				3		4	9	3	7	13	7	9	11	12	13	5	8	7	1		3		1		116
2	1			5	5	6	8	4	7	9	8	7	11	8	7	5	4		2	1					93
1	2	4	5	8	7	5	5	10	6	3	6	4	6	1	3	3									78
0	7	4	4	7	14	8	6	9	1	4	3	2	2			1			1						73
f	10	8	18	21	37	41	26	51	51	41	59	62	74	71	76	80	93	80	58	42	30	9	7	2	

TABLE 131.—*Variables: Alpha score, test 2 × beta total score. Group X: Special experimental group.*

BETA TOTAL.

ALPHA TEST 2.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–118	*f*
20	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
19	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
18	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	1	2	....	5
17	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	2
16	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	5	3	2	....	2	....	13
15	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	3	3	3	2	3	....	....	....	16
14	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	6	6	4	3	1	....	....	22
13	....	....	....	....	....	....	....	....	....	....	....	1	1	....	2	....	6	7	2	3	4	2	....	1	29
12	....	....	....	....	....	....	....	....	....	2	....	1	....	3	1	9	4	8	6	5	9	4	....	1	53
11	....	....	....	....	....	1	....	....	....	1	....	1	2	4	5	8	16	13	13	13	3	....	1	....	81
10	....	....	....	....	....	1	....	....	1	1	4	4	6	8	8	9	11	8	11	2	1	....	1	....	76
9	....	....	....	....	....	2	....	2	1	1	5	8	5	15	9	12	16	9	5	2	2	....	1	....	95
8	....	....	1	....	1	....	1	4	7	4	6	2	13	8	15	10	14	9	4	5	2	....	....	....	106
7	....	....	....	1	1	1	2	6	6	4	8	14	10	5	11	11	6	7	1	....	....	....	....	....	94
6	....	....	1	....	5	4	3	8	4	1	8	8	10	9	9	12	7	4	2	....	....	....	....	....	95
5	....	....	1	4	3	5	1	4	5	6	11	6	10	6	7	3	3	1	....	1	....	....	....	....	77
4	....	1	....	1	2	5	5	4	7	6	5	5	9	7	3	4	4	2	....	....	....	....	....	....	70
3	....	....	3	1	5	1	5	8	5	6	4	3	6	3	4	....	3	....	....	1	....	....	....	....	58
2	....	....	3	4	5	3	3	8	5	5	5	6	....	2	1	....	....	1	....	....	....	....	....	....	51
1	1	....	5	2	6	9	3	4	2	2	1	2	1	....	....	....	....	....	....	....	....	....	....	....	38
0	9	7	4	8	9	9	3	3	8	2	2	1	....	1	....	....	....	....	....	....	....	....	....	....	66
f	10	8	18	21	37	41	26	51	51	41	59	62	74	71	76	80	93	80	58	42	30	9	7	2	

TABLE 132.—*Variables: Alpha score, test 3 × beta total score. Group X: Special experimental group.*

BETA TOTAL.

ALPHA TEST 3.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–118	*f*
16	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....	2
15	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	4	4	2	1	....	13
14	....	....	....	....	....	....	....	1	....	....	....	....	1	....	....	....	....	2	2	4	3	1	....	....	13
13	....	....	....	....	....	....	....	....	....	....	....	1	....	1	1	1	2	2	5	5	3	2	3	....	26
12	....	....	....	....	....	....	....	....	....	....	....	....	....	2	1	5	5	3	4	5	3	1	....	....	29
11	....	....	....	....	....	....	....	....	....	....	1	2	....	2	2	4	6	9	5	3	1	2	....	....	37
10	....	....	....	....	....	....	....	....	....	....	2	....	5	5	2	3	14	9	4	4	4	....	....	1	54
9	....	....	....	....	....	2	....	....	1	2	1	3	4	11	8	6	13	8	7	4	4	1	2	....	77
8	....	....	....	....	....	2	....	....	1	....	5	2	7	10	14	11	12	19	11	6	3	....	....	....	103
7	....	....	....	....	....	1	1	3	4	4	5	13	6	11	12	15	16	11	11	3	3	....	1	....	120
6	....	....	....	....	1	1	....	2	4	....	6	6	13	4	12	11	11	8	4	2	....	....	....	....	85
5	....	....	....	1	3	1	3	4	5	5	7	7	9	4	10	8	5	6	1	1	2	....	....	....	82
4	....	....	1	1	....	5	4	4	2	5	7	7	10	5	6	8	8	1	1	....	....	....	....	....	75
3	....	1	....	1	....	2	....	7	5	5	7	7	9	8	3	2	....	....	1	....	....	....	....	....	58
2	....	1	1	2	....	3	3	6	8	5	4	4	1	3	4	4	....	....	....	....	....	....	....	....	49
1	....	1	3	2	7	5	8	10	8	5	4	3	3	1	1	....	....	....	....	....	....	....	....	....	61
0	10	5	13	14	26	19	7	14	13	10	10	7	6	4	....	2	....	1	1	1	....	....	....	....	163
f	10	8	18	21	37	41	26	51	51	41	59	62	74	71	76	80	93	80	58	42	30	9	7	2	

TABLE 133.—*Variables: Alpha score, test 4 × beta total score. Group X: Special experimental group*

BETA TOTAL.

ALPHA TEST 4.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–118	*f*
40	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1
38–39	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	....	2
36–37	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1
34–35	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1
32–33	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	1	1	1	....	....	....	5
30–31	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	2	3	4	....	2	1	14
28–29	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	1	2	2	2	2	1	....	....	12
26–27	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	2	6	3	1	....	1	1	....	15
24–25	....	....	....	....	....	....	....	....	....	1	....	1	1	3	....	2	4	4	6	2	4	1	....	....	29
22–23	....	....	....	....	....	....	....	1	....	....	....	....	....	1	4	2	1	6	4	4	1	....	1	....	25
20–21	....	....	....	....	....	....	....	....	....	....	....	1	3	1	....	2	7	4	4	8	....	2	....	....	33
18–19	....	....	....	....	....	....	....	....	1	....	1	1	2	1	4	5	8	4	3	5	3	3	....	1	42
16–17	....	....	....	....	....	....	....	1	....	....	1	3	2	3	3	11	7	10	6	2	4	....	1	....	54
14–15	....	....	....	....	....	1	....	....	1	1	1	2	5	7	5	8	7	10	4	2	2	....	1	....	57
12–13	....	....	....	....	....	....	....	....	1	1	4	2	1	8	5	8	4	6	4	4	1	....	....	....	49
10–11	....	....	....	....	....	2	1	1	1	....	3	3	2	11	5	4	11	4	1	3	2	....	....	....	54
8– 9	....	....	....	....	....	....	....	3	2	1	3	....	4	5	8	7	10	3	3	....	....	....	....	....	49
6– 7	....	....	2	....	....	2	....	3	1	4	3	7	5	7	7	9	8	5	5	2	3	....	....	....	73
4– 5	....	....	....	....	2	2	2	4	2	3	6	6	6	4	9	3	7	4	3	1	....	....	....	....	64
2– 3	....	1	1	1	....	2	3	5	8	7	6	6	7	6	10	3	4	1	2	....	1	....	....	....	74
0– 1	10	7	15	20	35	32	20	33	34	23	31	30	35	12	16	14	10	9	4	2	1	....	....	....	393
f	10	8	18	21	37	41	26	51	51	41	59	62	74	71	76	80	93	80	58	42	30	9	7	2	

TABLE 134.—*Variables: Alpha score, test 5 × beta total score. Group X: Special experimental group.*

BETA TOTAL.

ALPHA TEST 5.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–118	*f*
24													1								3		1		5
23																			2		2				4
22																	2	3	1		1	1	2	1	11
21															1			3		1	2				7
20									1							2		3	2	2	1	3	1		15
19														2			2	2	1	2			1		10
18														1			1	1	1	6	3	2			15
17															1	1	2	3	2	3	1				13
16										1		1	1			1	8	2	5	3				1	23
15											1	1	1	1		4	6	8	1	5	1	2			31
14									1	1	1	2	1	4	2	3	6	6	3	4					34
13								1				1		3	5	2	8	4	5	2	4				35
12				1		1					2	3	4	4	2	5	6	8	8	1	4		1		50
11						1			1	1	3	2	3	4	4	10	4	5	5	3	2	1			49
10				1		1		1	2			3	6	7	8	4	5	3	2	3	1				47
9						1		1	1	1	1	1	5	3	5	4	6	5	4	1	1				43
8			1			1		5	2	1	2	4	3	4	6	7	11	6	5		1				59
7		1		1	1		2	2	3	3		2	3	5	2	4	2	6	3	1			1		42
6					1	3	2	4	4	2	3	2	4	5	8	2	3	5	2	2					52
5					2	1	1	4	1		3	6	7	5	7	6	5	1			1				50
4			1		2	2	2	4	7	5	8	6	3	6	7	4	2		2	1					62
3					1	2	1	3	6	8	5	6	4	3	3	2	1	1							46
2			1	3	1	4	3	5	2	3	4	7	5	5	2	4	2	1		2					54
1			2	1	4	4	2	4	3	1	6	2	5		3	4	4	1							46
0	10	7	13	11	25	20	13	17	17	14	16	13	18	9	10	11	7	3	4	1	2				244
f	10	8	18	21	37	41	26	51	51	41	59	62	74	71	76	80	93	80	58	42	30	9	7	2	

TABLE 135.—*Variables: Alpha score, test 6 × beta total score. Group X: Special experimental group.*

BETA TOTAL.

ALPHA TEST 6.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–118	*f*
20																									
19																									
18																			1						1
17																				2	2		1		5
16																		1	2			1			4
15																1		2	2	2	2	1			10
14																1		2	1	3	1		2		10
13											1					2	1	5	2	3	1	3			18
12										2					1	3	6	7	4	6	6	1	1		37
11										1				3	5	6	12	9	11	2	4	1	2	1	57
10									1		1	2	3	8	4	11	13	10	11	8	5	1			78
9										1	4	2	5	5	10	11	16	16	11	3	4		1		89
8								1		1	5	4	9	9	7	9	4	4	8	2	1			1	66
7					1	1		2	2	1	5	5	9	7	7	13	7	9	5	2	1				77
6					1	2		4		1	7	8	8	5	7	7	8	8	1	2					69
5				2		1	1	6	4	4	7	11	12	12	7	7	6	1	1		1				83
4						2	1	3	7	3	4	4	10	1	4	5	6	1	1						52
3			1	1	2	2		4	6	5	7	6	7	5	7	7	2		1		1				59
2		1		1	4	4	9	9	8	5	5	5	4		6	1	2								64
1			6	2	4	7	6	8	6	6	9	10	10	5	4		3	4		1					91
0	10	7	11	15	25	22	9	14	17	11	8	4	2	11	5	3	2	1							177
f	10	8	18	21	37	41	26	51	51	41	59	62	74	71	76	80	93	80	58	42	30	9	7	2	

TABLE 136.—*Variables: Alpha score, test 7 × beta total score. Group X : Special experimental group.*

BETA TOTAL.

ALPHA TEST 7.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–118	*f*
40																									
38–39																		1							1
36–37																1					2	1			4
34–35																		2	1	1	1				5
32–33															1			2	2		4				9
30–31																1		1	1			1	1	2	7
28–29																2	2	3	2		1	1	1		12
26–27																1			2	1	4		1		9
24–25												1					2	2	2	3	1	1	1		13
22–23												1				1	1		9		6		1		19
20–21													1	4			2	2	2	4	2		1		18
18–19														2	1	1	3	3	3	3	1	1			18
16–17									1					3	2	1	4	4		1		2			18
14–15										1			2	1	4	5	8	6	7	3	2	1			40
12–13								1		2		2	3	3	5	5	8	11	2	9	1				52
10–11									1	1	2		3	3	7	9	15	5	3	5	1	1	1		57
8–9							1	4	2	1	8	4	10	10	10	9	12	12	8	2	1				94
6–7				1	1	1		3	3	2	8	9	10	9	5	14	9	12	6	3	2				98
4–5		1	1	1		2	2	9	7	2	7	13	16	13	19	12	12	5	3	2					127
2–3	1		3	2	4	10	5	11	12	12	20	10	12	13	12	11	10	6	3	4	1				162
0–1	9	7	14	17	32	28	18	23	25	20	14	22	17	10	10	7	5	3	2	1					284
f	10	8	18	21	37	41	26	51	51	41	59	62	74	71	76	80	93	80	58	42	30	9	7	2	

TABLE 137.—*Variables: Alpha score, test 8 × beta total score. Group X: Special experimental group.*

BETA TOTAL.

ALPHA TEST 8.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–118	*f*
40																									
38–39																		3		1	1				4
36–37													1	2				1	2	1	2		1		10
34–35																	3	2	2	2	3	2	1		15
32–33										1					1	5	2	2	3	4	1	2			21
30–31													2	4	2		2	2	5	2	1	3		1	24
28–29											1		1	1	2	3	3	9	3	7	4		2		36
26–27						1								1	2	1	5	6	7	6	3		1	1	34
24–25											2	2		3	2	4	7	7	7	5	4	1			44
22–23												1	2	2	3	5	6	5	6	3	3	1			37
20–21									1	1		4	2	5	1	8	13	5	3	1	2				46
18–19						2		2		1	6	2	6	6	9	4	7	6	4	2	3		1		61
16–17						1		2	2		4	2	5	7	6	9	12	10	6	1	1		1		69
14–15				1			1		1			4	5	4	8	4	10	9	5	2	1				56
12–13				1		2		2	2	2	7	7	9	8	8	8	4	4	3	1					68
10–11					1	3		4	5	4	12	6	8	5	8	10	7	7		1	1				82
8–9				1	1	3	1	5	3	8	6	5	6	6	5	6	5	1	1						63
6–7		1			1	5	7	7	10	5	6	12	10	6	9	5	7	1		2					94
4–5			2		2	2	3	9	9	4	5	6	7	5	10	4			1						69
2–3			2	1	4	1	1	11	6	5	6	6	6	2		3				1					55
0–1	10	7	14	17	28	21	13	9	12	8	5	5	4	4		1		1							159
f	10	8	18	21	37	41	26	51	51	41	59	62	74	71	76	80	93	80	58	42	30	9	7	2	

TABLE 138.—*Variables: Beta score, test 1 × beta total score. Group X: Special experimental group.*

BETA TOTAL.

BETA TEST 1.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–118	*f*
10							1	1		1		2	2	2	8	6	9	14	14	12	12	7	3	1	95
9					1			1	1	4	3	4	5	9	13	15	26	16	16	12	6	2	3	1	138
8		1			2	3	4	3	10	10	11	11	24	16	17	19	27	19	19	11	10		1		218
7						7	6	11	13	9	11	15	14	19	15	15	17	13	5	5	1				176
6		1	2	2	4	6	4	9	5	7	11	10	11	11	8	14	10	10	3	1	1				130
5	2		1	5	9	8	3	5	6	2	5	6	8	7	7	5	1	5							85
4			6	6	6	5	6	5	6	5	5	5	5	5	4	2	1	2		1					75
3	1	1	4	4	4	6	1	6	5	2	5	2	2	1	1	2			1						48
2	2	2	1	1	7	3		6			7	3	2	1	2	2	1	1							41
1		2	2	1	3	2		4	3	1	1	1	1				1								22
0	5	1	2	2	1	1	1		2			3			1										19
f	10	8	18	21	37	41	26	51	51	41	59	62	74	71	76	80	93	80	58	42	30	9	7	2	

TABLE 139.—*Variables: Beta score, test 2 × beta total score. Group X: Special experimental group.*

BETA TOTAL.

BETA TEST 2.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–118	*f*
16														1	2		1	8	5	7	5	5	2		36
15												2	3	2		6	11	10	8	8	6	2	2	2	62
14									1		2	1	1	3	7	8	17	15	12	11	8	2	1		89
13										1		3	7	5	11	13	18	16	13	9	6		1		104
12					1			1	1	1	4	7	8	6	11	13	10	9	9	1	3		1		86
11								1	1	3	5	9	11	11	6	18	16	11	5	1	1				99
10					1	1		4	6	4	8	6	7	9	14	10	5	1	2	4	1				83
9						1	1	4	8	3	8	4	5	7	10	3	9	5	1	1					70
8						1	3	4	3	9	6	9	8	5	5	2	3	3							61
7				1	1	2	4	7	2	5	4	8	7	6	3	1	1	1	2						55
6			1	1	3	1	4	4	6	2	5	2	5	2	1			1	1						39
5			1	3	6	7	6	7	5	5			3	4	1	1									49
4		1		5	5	3	2	5	7	3	1	2	4	4	2	2	1								47
3			3	1	5	6	2	5	3	2	3	2	1	3	3	1									40
2	1	1	4		4	5	1	3	4	1	5	1	1	1											32
1	1	3	4	6	7	5	1	4	2		4	1	2	1											41
0	8	3	5	4	4	9	2	1	2	2	4	5	1	1		2	1								54
f	10	8	18	21	37	41	26	51	51	41	59	62	74	71	76	80	93	80	58	42	30	9	7	2	

TABLE 140.—*Variables: Beta score, test 3 × beta total score. Group X: Special experimental group.*

BETA TOTAL.

BETA TEST 3.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–118	*f*
12												1		2	1	7	3	17	20	16	16	5	7	1	96
11											1	1	4	4	6	6	23	15	20	13	9	2			104
10										2	3	6	5	12	16	26	38	29	14	9	3	1		1	165
9								1	1	4	11	13	9	16	25	18	13	8	2	2		1			124
8							1	2	5	1	4	8	15	10	7	10	5	4	1	1					74
7						1	2	3	1	4	6	7	9	3	6	2	3	1		1					49
6						1	1	1	3	5	7	4	4	6	6	2	2	3	1		1				49
5					2	1	3	6	8	5	10	6	11	7	3	4	4	2			1				73
4			1		1	2	1	6	9	4	4	5	5	6	2	3	1	1							51
3			3	2	3	4		8	5	3	4	3	2	3	3	1									44
2	1	1	2	7	4	13	6	12	8	8	2	2	8	1											75
1			5	3	16	14	7	6	5	3	5	3	2		1	1									71
0	9	7	7	9	11	5	5	4	6	2	2	3		1			1								72
f	10	8	18	21	37	41	26	51	51	41	59	62	74	71	76	80	93	80	58	42	30	9	7	2	

TABLE 141.—*Variables: Beta score, test 4 × beta total score. Group X: Special experimental group.*

BETA TOTAL.

BETA TEST 4.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–118	*f*
30									1										2	3	5	2	5	2	20
28																		1		3	1	1			9
26																	1	1	3	4	3	5	1		18
24														2		2	4	6	7	11	8	1			41
22													1	1		6	7	9	10	7	8				49
20													1	3	5	9	13	19	17	12	3				82
18										1	3	1	2	6	9	12	19	15	12	1					81
16									3	2	3	3	7	15	18	16	26	18	5	1					117
14								1	4	5	8	8	19	17	24	18	18	6							129
12							1	1	1	5	5	12	22	15	13	12	2	3	1						93
10					1	3	2	6	8	8	13	18	17	8	8	4	3	1							97
8					1	4	1	10	8	7	12	15	1	3	1	1									64
6			1	3	8	5	7	12	12	8	5	2	2		1			1							62
4			1	4	7	8	6	10	7	3	3	1							1						51
2		2	1	8	13	15	4	4	3		4	1													50
0	10	6	15	11	12	6	5	7	4	2	2	1	2	1											84
f	10	8	18	21	37	41	26	51	51	41	59	62	74	71	76	80	93	80	58	42	30	9	7	2	

TABLE 142.—*Variables: Beta score, test 5 × beta total score. Group X: Special experimental group.*

BETA TOTAL.

BETA TEST 5.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–118	*f*
25															2	1		2	6	1	4	1	1	2	20
24												1					2	3	4	3	1	2	2		18
23													1			3	4	6	3	5	5		3		30
22															2	4	4	10	2	6	8	2	1		39
21												1		1	1	1	5	4	7	6	5	2			33
20											1	1			3	2	5	4	3	6	3	2			32
19													2	1	6	5	13	14	11	7	2				61
18										1		2	4	3	6	11	12	13	7	6	1				70
17							1	1	1	1	3	3	4	7	7	9	15	8	3	1	1				65
16											2	2	6	7	8	9	8	4	3	1					50
15								2		1	6	3	13	7	9	14	12	6	3						76
14						1		5	1	1	7	14	8	15	5	4	7	2	2						72
13					1			2	5	1	6	5	3	6	13	9	9	3	1						55
12						1	1	2	7	2	6	6	5	8	6	4	2	2							52
11					2	1	2	2	5	6	4	6	11	6	3				1						49
10					1		3	5	3	6	4	8	6	5	1		1								43
9						2	1	6	8	5	5	3	5	2	1	2		1							41
8				2	2	2	4	6	6	3	3	4		1		1									34
7					1	5	3	6	7	5	4	1	3		1	1									37
6					6	7	1	5	4	5	2	1													31
5			1		1	1	1	2					1		1				1						9
4			1	2	8	2	2	1			3														19
3			1	2	3	3			1	2			1	1	1										15
2	1	1	3	3	4	6	2	1		1		1		1											24
1		2	4	5		4	1	1																	17
0	9	5	8	7	8	5	4	4	3	1			1												55
f	10	8	18	21	37	41	26	51	51	41	59	62	74	71	76	80	93	80	58	42	30	9	7	2	

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TABLE 143.—*Variables: Beta score, test 6 × beta total score. Group X: Special experimental group.*

BETA TOTAL.

BETA TEST 6.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–118	*f*
20																2	4	1	1		2	2	3	2	17
19														2	1		4	3	3	6	3	1	1		24
18											1		1	1		2	6	6	4	9	3	2	2		37
17											1	1	2	1	3	5	11	9	6	5	5	1	1		51
16								1			2	2	6	5	11	12	9	12	13	9	7	1			90
15									1	1	1		8	7	9	14	16	3	7	10	4	1			82
14						1	1			2	3	8	5	7	17	15	8	20	10	1	3				101
13							1	1	4	3	3	9	16	14	9	11	12	7	7		3	1			101
12						2		1	4	4	5	11	12	8	7	9	9	10	3	1					86
11					4	2	2	3	9	7	13	6	10	10	10	3	7	5	1	1					93
10			1	2	3	8		5	5	4	14	7	8	8	4	4	2		2						77
9		1	1	2	4	4	7	12	11	9	6	9	3	3	3	1	3	1	1						81
8			1	4	7	10	1	12	8	5	2	4		3	2	2	1	1							63
7			2	1	6	6	6	6	1	3	4	2	3	1				1							42
6		1	1	2	3	3	3	6	5	3	2	2		1				1							33
5			2	5	3	1	3	2	2																18
4	1		3	3	2	1	2	1	1		1	1													16
3	1		1	1	4						1						1								9
2		2	3		1	2		1																	9
1	1		2	1		1																			5
0	7	4	1																						12
f	10	8	18	21	37	41	26	51	51	41	59	62	74	71	76	80	93	80	58	42	30	9	7	2	

TABLE 144.—*Variables: Beta score, test 7 × beta total score. Group X: Special experimental group.*

BETA TOTAL.

BETA TEST 7.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–118	*f*
10											3	1	2	4	7	13	9	14	21	9	11	5	5	1	105
9									1		2	1	4	6	10	7	21	13	13	10	9	2	2	1	102
8								1	2	1	2	5	7	6	6	7	14	12	5	6	3				76
7						2			2	2	3	3	12	15	9	13	20	10	5	5	4	1			106
6						1	2	3	2	10	6	11	13	9	18	15	5	9	3	4	1	1			113
5					1	1	3	7	10	7	11	14	9	11	11	13	14	11	5	5	2				137
4					3	1	3	6	7	4	11	10	10	13	11	6	3	6	4	1					99
3		1	3	1	2	7	6	9	5	5	4	9	6	2	2	4	3	3	2	2					76
2				1	5	7	3	4	5	11	3	7	4	9	1	3									65
1	2	2	4	2	9	10	3	13	5	1	3	1	4	2	1		1	2							65
0	8	5	10	13	15	14	5	7	6	9	7		3	1		1									104
f	10	8	18	21	37	41	26	51	51	41	59	62	74	71	76	80	93	80	58	42	30	9	7	2	

TABLE 145.—*Variables: Alpha scores, test 1 × mental age Stanford-Binet examination. Group X: Special experimental group.*

STANFORD-BINET MENTAL AGE.[1]

ALPHA TEST 1.—Directions.	5–5.9	6–6.9	7–7.9	8–8.9	9–9.9	10–10.9	11–11.9	12–12.9	13–13.9	14–14.9	15–15.9	16–16.9	17–17.9	18–18.9	19–19.9	*f*
12									1		1	1	2	1		6
11										3		4	3	5	2	17
10								2	4	4	5	3	6	10		34
9									2	7	7	7	6	6	1	36
8								7	8	6	5	14	5	8		53
7				1	1	1	6	11	5	9	9	3	10	3		59
6					2	3	4	5	14	19	12	8	9			76
5				3	4	9	10	12	10	11	11	6	3		1	80
4					3	9	9	15	6	7	5	5	1	1	1	62
3				2	10	10	18	10	8	7	3	1	1			70
2				2	16	13	12	7	4	1	3	1				59
1				6	13	11	6	8	4	2	1	1	1			53
0	1	2	1	8	13	10	4	4	3	1	1					48
f	1	2	1	22	62	66	69	81	69	77	63	54	47	34	5	653

[1] In the original tables from which computations were made intervals of one half year mental ages were used. In the present table 5 include the range from 5 to 5.9 years 6 the range from 6 to 6.9 years, etc.

TABLE 146.—*Variables: Alpha score, test 2 × mental age Stanford-Binet examination. Group X: Special experimental group.*

STANFORD-BINET MENTAL AGE.

ALPHA TEST 2.—Arithmetical problems.	5–5.9	6–6.9	7–7.9	8–8.9	9–9.9	10–10.9	11–11.9	12–12.9	13–13.9	14–14.9	15–15.9	16–16.9	17–17.9	18–18.9	19–19.9	*f*
20																
19																
18												1	1	1	1	4
17													1	1		2
16										1			4	3		8
15											1	1	4	3	2	11
14									1	1	3	1	4	5		15
13							1				3	5	3	3		15
12								2	3	6	10	8	9			38
11						1		3	5	16	9	11	4	4	1	54
10							5	8	6	7	9	10	4			49
9					1	1	6	13	6	13	10	7	7	3	1	68
8					3	1	6	7	8	10	13	4	5	2		59
7				1	3	6	7	15	11	8	3		2			56
6					7	4	10	9	11	8	3	1				53
5				1	5	9	8	8	7	2		1				41
4				1	6	5	9	3	4	7	1					36
3				2	7	12	6	7	4		1					39
2				4	10	11	6	2	3		1	1				38
1				3	9	7	2	2	1			1				25
0	1	2	1	10	11	9	3	4		1						42
f	1	2	1	22	62	66	69	81	69	77	63	54	47	34	5	653

TABLE 147.—*Variables: Alpha score, test 3 × mental age Stanford-Binet examination. Group X: Special experimental group.*

STANFORD-BINET MENTAL AGE.

ALPHA TEST 3.—Practical judgment.	5–5.9	6–6.9	7–7.9	8–8.9	9–9.9	10.0–10.9	11.0–11.9	12.0–12.9	13.0–13.9	14.0–14.9	15.0–15.9	16.0–16.9	17.0–17.9	18.0–18.9	19.0–19.9	*f*
16																
15											2	4	1	3		10
14								1		1	1	1	3	4		11
13						1			1	1	3	6	4	4	1	21
12						1	1	1	1	1	3	4	6	2	2	22
11							1		4	5	6	7	1	1		25
10					1		2	3	6	4	7	4	3	7		37
9						1	2	5	7	12	6	5	1	5		44
8				1		1	4	9	9	17	10	[illegible]	10	4		74
7					1	4	4	10	12	9	10	3	7	3	1	64
6					1	7	6	6	8	5	4	3	2			42
5					2	5	11	13	2	7	3	4	1	1		49
4					5	3	9	7	5	5	5	3				42
3				2	3	2	6	5	5	6	1		1			31
2				1	5	10	3	5	2		1					27
1				2	14	7	8	5	4	1	2	1	1			45
0	1	2	1	16	30	24	13	10	7	4		1				109
f	1	2	1	22	62	66	69	81	69	77	63	54	47	34	5	653

TABLE 148.—*Variables: Alpha score, test 4 × mental age Stanford-Binet examination. Group X: Special experimental group.*

STANFORD-BINET MENTAL AGE.

ALPHA TEST 4.—Synonym-Antonym.	5–5.9	6–6.9	7–7.9	8–8.9	9–9.9	10–10.9	11–11.9	12–12.9	13–13.9	14–14.9	15–15.9	16–16.9	17–17.9	18–18.9	19–19.9	*f*
40													1			1
38–39														1	1	2
36–37													1			1
34–35														1		1
32–33														1	2	3
30–31											1	1	4	1		7
28–29												1	3	3	1	8
26–27										2		2	4	3		11
24–25											3	6	2	6		17
22–23								1	2	1	4	5	5	3		21
20–21									3	5	3	5	6	2		24
18–19							1			7	8	5	3	1	1	29
16–17							1	3	4	6	5	4	4	2		29
14–15						1		6	7	4	9	8	4			39
12–13							2	3	4	7	6	2	2			26
10–11					1	1	5	7	3	4	4	3	2	1		31
8–9						1	4	3	4	3	5	4	1	2		27
6–7					2	1	7	7	8	13	3	2	1	2		46
4–5				1	1	5	9	12	2	5	3	2		2		42
2–3				1	5	5	4	9	4	7	3	2	2			42
0–1	1	2	1	20	53	52	36	30	28	13	6	2	2			246
f	1	2	1	22	62	66	69	81	69	77	63	54	47	34	5	653

TABLE 149.—*Variables: Alpha score, test 5 × mental age Stanford-Binet examination. Group X: Special experimental group.*

STANFORD-BINET MENTAL AGE.

ALPHA TEST 5—Disarranged sentences.	5–5.9	6–6.9	7–7.9	8–8.9	9–9.9	10–10.9	11–11.9	12–12.9	13–13.9	14–14.9	15–15.9	16–16.9	17–17.9	18–18.9	19–19.9	*f*
24	....	....	....	....	....	....	....	....	....	1	....	1	....	2	....	4
23	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	2
22	....	....	....	....	....	....	....	1	....	....	....	2	2	1	....	6
21	....	....	....	....	....	....	....	....	1	....	....	....	....	1	1	3
20	....	....	....	....	....	....	....	1	1	1	4	....	3	1	1	12
19	....	....	....	....	....	....	....	....	....	2	1	....	2	2	....	7
18	....	....	....	....	....	....	....	....	....	....	....	1	2	4	....	7
17	....	....	....	....	....	....	1	....	1	1	....	1	1	4	1	10
16	....	....	....	....	....	....	....	....	....	2	....	3	7	1	....	13
15	....	....	....	....	....	....	1	2	1	3	3	4	2	3	....	19
14	....	....	....	....	....	1	1	1	3	3	3	5	3	1	....	21
13	....	....	....	....	....	....	....	1	1	5	3	3	2	2	....	17
12	....	....	....	....	....	....	1	2	3	4	5	7	5	3	....	30
11	....	....	....	....	....	1	....	4	1	3	6	6	5	1	....	27
10	....	....	....	....	....	1	4	2	[illegible]	3	5	1	5	1	1	25
9	....	....	....	....	....	1	2	3	5	6	3	3	....	[illegible]	....	25
8	....	....	....	....	1	1	3	10	3	5	4	5	....	[illegible]	....	34
7	....	....	....	....	2	1	1	4	5	2	4	1	2	....	1	23
6	....	....	....	....	2	3	2	4	7	6	8	4	....	....	....	36
5	....	....	....	....	2	2	5	2	6	7	1	1	....	....	....	26
4	....	....	....	1	8	7	4	9	6	5	1	2	....	1	....	44
3	....	....	....	1	7	3	4	4	7	2	1	....	....	1	....	30
2	....	....	....	1	2	7	8	7	3	3	3	....	....	....	....	34
1	....	....	....	1	4	[illegible]	7	5	3	1	3	1	....	....	....	29
0	[illegible]	[illegible]	1	18	34	34	25	19	10	12	5	3	5	....	....	169
f	1	2	1	22	62	66	69	81	69	77	63	54	47	34	[illegible]	653

TABLE 150.—*Variables: Alpha score, test 6 × mental age Stanford-Binet examination. Group X: Special experimental group.*

STANFORD-BINET MENTAL AGE.

ALPHA TEST 6—Number series completion.	5–5.9	6–6.9	7–7.9	8–8.9	9–9.9	10–10.9	11–11.9	12–12.9	13–13.9	14–14.9	15–15.9	16–16.9	17–17.9	18–18.9	19–19.9	*f*
20	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
19	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
18	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1
17	....	....	....	....	....	....	....	....	....	1	1	1	1	....	....	4
16	....	....	....	....	....	....	....	....	....	....	....	1	1	....	1	3
15	....	....	....	....	....	....	....	....	....	....	....	2	1	5	....	8
14	....	....	....	....	....	....	....	....	....	1	1	4	....	2	....	8
13	....	....	....	....	....	....	....	1	....	....	2	....	2	2	1	9
12	....	....	....	....	....	....	1	1	3	1	2	4	5	3	1	21
11	....	....	....	....	....	....	2	3	2	6	4	7	9	6	....	39
10	....	....	....	....	....	....	....	2	6	8	7	10	10	6	2	51
9	....	....	....	....	....	....	1	2	11	8	11	10	7	5	....	55
8	....	....	....	....	1	1	2	6	1	10	10	3	2	3	....	39
7	....	....	....	....	1	1	4	8	5	11	7	4	2	....	....	43
6	....	....	....	....	....	3	9	6	7	7	3	3	3	....	....	41
5	....	....	....	....	4	6	6	12	8	5	2	1	....	1	....	45
4	....	....	....	....	3	5	7	4	2	3	6	1	2	....	....	33
3	....	....	....	1	2	6	2	6	8	3	2	2	1	....	....	33
2	....	....	....	2	5	9	8	8	8	1	....	....	....	....	....	41
1	....	....	....	2	13	17	13	9	3	9	2	1	....	....	....	69
0	1	2	1	17	33	18	14	13	5	3	2	....	1	....	....	110
f	1	[illegible]	1	22	62	66	69	81	69	77	63	54	47	34	5	653

TABLE 151.—*Variables: Alpha score, test 7 × mental age Stanford-Binet examination. Group X: Special experimental group.*

STANFORD-BINET MENTAL AGE.

ALPHA TEST 7.—Analogies.	5–5.9	6–6.9	7–7.9	8–8.9	9–9.9	10–10.9	11–11.9	12–12.9	13–13.9	14–14.9	15–15.9	16–16.9	17–17.9	18–18.9	19–19.9	*f*
36	....	....	....	....	....	....	....	....	....	....	....	1	1	1	....	3
34–35	....	....	....	....	....	....	....	....	....	....	....	....	1	2	....	3
32–33	....	....	....	....	....	....	....	....	1	....	....	....	1	2	....	4
30–31	....	....	....	....	....	....	....	....	....	....	....	....	2	[illegible]	1	5
28–29	....	....	....	....	....	....	....	....	....	....	....	3	....	4	....	7
26–27	....	....	....	....	....	....	....	....	....	....	1	1	1	2	1	6
24–25	....	....	....	....	....	....	....	....	....	2	1	1	....	3	....	7
22–23	....	....	....	....	....	....	....	....	2	1	2	2	3	3	....	13
20–21	....	....	....	....	....	....	....	....	....	....	2	3	3	3	....	11
18–19	....	....	....	....	....	....	....	1	....	2	3	1	1	1	....	9
16–17	....	....	....	....	....	....	1	....	....	....	1	5	4	1	....	12
14–15	....	....	....	....	....	....	....	....	3	3	2	3	5	2	3	21
12–13	....	....	....	....	....	....	2	1	5	4	6	4	5	1	....	28
10–11	....	....	....	....	....	1	3	3	6	5	4	5	5	1	....	33
8– 9	....	....	....	....	....	2	6	12	4	9	7	5	3	2	....	50
6– 7	....	....	....	3	2	3	4	7	10	13	7	7	3	1	....	60
4– 5	....	....	....	....	6	9	13	11	8	13	10	4	5	1	....	83
2– 3	....	....	....	2	7	18	12	20	15	13	11	6	1	1	....	106
0– 1	1	2	1	17	47	33	28	23	15	12	6	3	3	1	....	192
f	1	2	1	22	62	66	69	81	69	77	63	54	47	34	5	653

TABLE 152.—*Variables: Alpha score, test 8 × mental age Stanford-Binet examination. Group X: Special experimental group.*

STANFORD-BINET MENTAL AGE.

ALPHA TEST 8.—Information.	5–5.9	6–6.9	7–7.9	8–8.9	9–9.9	10–10.9	11–11.9	12–12.9	13–13.9	14–14.9	15–15.9	16–16.9	17–17.9	18–18.9	19–19.9	*f*
38–39														2		2
36–37										1	1		1	2	1	6
34–35												4	2	1	2	9
32–33									1	1	2	1	2	4		11
30–31										1	3	3	5	3	1	16
28–29								1	2	1	1	4	5	5		19
26–27									1	1	5	7	5	2		21
24–25							1	1	2	5	7	3	5	1		25
22–23					1		1	1	4	6	5	7	2	2		29
20–21						1	2	4	4	5	5	4	2			27
18–19							5	7	4	6	5	3	3	3		36
16–17						2	6	8	5	3	7	1	4	3	1	40
14–15					1		3	1	8	13	3	5	5	1		40
12–13					3	4	9	2	4	11	6	3	1	2		45
10–11				1	2	1	8	9	6	7	5	1	2	2		44
8–9				1	2	6	2	8	5	4	3	3				34
6–7				1	4	10	11	12	7	7	1	3	3			59
4–5				1	7	10	5	11	6	3	1					44
2–3				2	9	8	4	7	5	1	1			1		38
0–1	1	2	1	16	33	24	12	9	5	1	2	2				108
f	1	2	1	22	62	66	69	81	69	77	63	54	47	34	5	653

TABLE 153.—*Variables: Alpha raw score × mental age Stanford-Binet examination. Group X: Special experimental group.*

STANFORD-BINET MENTAL AGE.[1]

ALPHA RAW SCORE.	5–5.9	6–6.9	7–7.9	8–8.9	9–9.9	10–10.9	11–11.9	12–12.9	13–13.9	14–14.9	15–15.9	16–16.9	17–17.9	18–18.9	19–19.9	*f*
180–189													1	1	1	3
170–179														1		1
160–169												1	1	4	1	7
150–159											1	1	2	1		5
140–149											1	2	4	4	1	12
130–139										1	2		5	9		17
120–129									1	3	1	9	4	2	1	21
110–119									1	4	3	6	6	1		21
100–109									2	1	6	7	3	3		22
90–99								3	6	5	8	8	5	4		39
80–89						1	2	7	6	11	12	5	7	1	1	53
70–79						1	3	6	4	11	7	4	2			38
60–69							3	7	11	9	11	6	4	2		53
50–59					2	1	8	7	4	10	4		2			38
40–49					2	5	13	12	8	8	2	2	1			53
30–39				2	3	9	15	15	11	9	2	1		1		68
20–29					11	13	9	10	10	4	2	1				60
10–19				5	15	18	8	9	4		1					60
0–9	1	2	1	15	29	18	8	5	1	1		1				82
f	1	2	1	22	62	66	69	81	69	77	63	54	47	34	5	653

[1] In original tables, from which computations were made, intervals of half-year mental ages were used. In the present table 5 includes the range from 5 to 5.9, 6 the range from 6 to 6.9, etc.

TABLE 154.—*Variables: Beta total score × alpha total score. Group X: Special experimental group.*

ALPHA TOTAL.

BETA TOTAL.	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–119	120–124	125–129	130–134	135–139	140–144	145–149	150–154	155–159	160–164	165–169	170–174	175–179	180–184	185–189	*f*
115–118																										1					1								2
110–114																	1						1				1		1		1		1					1	7
105–101																								1	1	1	3						1	1			1		9
100–104													1				1	3	2	3	1	1	1		2	1	4	1		1	2	1	1	2	1			1	30
95–99				1						1		1		2	2	1	3	1		2	1	3	2	6	1	2	2	3	2	2			1						42
90–94									1		1		2	4	4			3	1	8	6	2		4	4	2	1	1	3	2	2		1	1	1				58
85–89			1					1	2		4	7	3	5	3	6	4	4	8	5	4	3	3	1	6		2	2			2		2		1		1	80
80–84							2		5	4	4	3	11	6	7	9	3	8	8	1	4	3	3			3	2	2	1	1									93
75–79			1		1	1		5	4	4	4	4	7	6	2	2	10	7	2	4	5	3	1	1	1	1		1											80
70–74				1	1	3	6	6	5	6	5	5	6	5	7	4	5	2	4	3				1		1													76
65–69		1	1	2	1	2	3	7	5	4	3	5	8	3	2	4	1	4	3	4	1	3		1	2	1													71
60–64			3	2	3	6	7	6	9	9	6	5	2	4	4	1	4						1		1		1												74
55–59		2	1	2	8	8	8	4	6	3	3	1	7	1	4				2	1			1		1														62
50–54			1	5	7	8	8	6	2	3	5	6	2		2		3		1																				59
45–49	2	3	5	4	5	6	3	4	2	2		2		1				1								1													41
40–44	3	6	6	2	9	6	4	6	1	1	5	1										1																	51
35–39	2	6	8	5	7	5	5	4	2	1	1	2	1		1			1																					51
30–34	5	3	4	2	5	2	2	3																															26
25–29	13	6	1	4	3	3	1	2	4			1			2							1																	41
20–24	14	9	7	2	3		1	1					1	1																									37
15–19	10	4	2		2			1		1										1																			21
10–14	8	4	3	1			1			1																													18
5–9	5	2				1																																	8
0–4	8	2																																					10
f	70	48	44	33	55	50	56	55	46	42	37	40	46	40	41	26	43	31	25	41	20	22	13	20	14	21	10	13	9	7	6	5	4	7	2	1	1	3	

In the first place, it is evident from study of score distributions of each of the alpha and beta tests that they are not coextensive as regards range of ability measured. The alpha examination itself is not a homogeneous scale, but a composite of eight short scales, each much more nearly homogeneous than the composite total alpha. Alpha must be treated as a composite for two reasons: (1) Certain of its component tests are very much more difficult than others, so that examinees of less than average intelligence do not in general register their ability in all of the tests. (2) Owing to the fact that the total time allowed for the alpha examination is rigidly apportioned among the eight tests, since all subjects begin and stop each test according to a fixed schedule, the collection of the eight tests into an "examination" is mainly a matter of administrative convenience, with relatively little implication of quantitative or qualitative equivalence. It follows from what has just been stated that subjects who are able to score in all of the alpha tests obtain total scores that are not comparable with total scores earned by individuals who failed in some of the tests. The reason for this difference is that in obtaining an individual's total score by adding together the scores in each test, scores of 0 are treated arithmetically the same as other scores. There are psychological reasons, however, why 0 as a score can not be regarded as a point on a linear scale, although other scores can be so regarded. This distinction between the mathematical zero and "psychological" zero is an important one, for failure to recognize it is a serious pitfall in the statistical analysis of psychological data. Zero as a test score means some unmeasured amount of ability that is less than the amount required to earn a score of one point. Thus, if a high degree of ability is necessary to earn a score of one point in a certain test, it is obvious that the range of ability covered by the zero-score is a very wide one, although the ranges corresponding to scores of one point, two points, etc., may be very short. A score of zero, therefore, does not mean *no ability at all;* it does not mean the point of discontinuance of the thing measured; it means the point of discontinuance of the instrument of measurement, the test. Zero is an arbitrary origin on the measuring scale, corresponding in some tests to much higher grades of ability than in others; above zero we count in positive numbers and below it we should count in negative numbers. Why in practice the range of negative scores is not used is the necessary consequence of the methods of testing intelligence, but this limitation constitutes no obstacle to the use of negative scores in the statistical analysis of test data.

The fact that zero points are disposed at different levels of intelligence for different tests would be of no consequence if negative scores could be registered; but since they can not be, the individual who fails to earn a positive score and is marked zero is actually thereby given a bonus varying in value directly with his stupidity. Since in alpha the zero points in most of the tests are relatively high in the scale of intelligence, many individuals of low intelligence would obtain negative total scores, if their intelligence could betray itself in appropriate negative scores in each of the component tests. As it actually works out, these low-grade individuals are improperly piled up, in the total score distribution, above the zero point. Thus the skewness or, better, piling-up of cases in the lower class intervals of the alpha total score distribution is accounted for.

The situation is somewhat different with beta total scores. Here certain tests, besides being limited at the lower end of the acale, are also limited at the top, so that high-grade individuals do not have the opportunity to earn all that they are capable of earning. The beta tests were primarily designed to measure low-grade intelligence, and they are for the most part inadequate measures of high-grade intelligence. The piling up of cases in terminal class intervals, which we interpret as indicative of limitation of range, is predominantly at the upper end of three of the seven beta tests, with a resulting negative skewness of the total score distribution.

These peculiarities of the components of the alpha and beta examinations also account for the very marked skewness of regression of either variable on the other, that is apparent from the form of the regression curves calculated by Prof. Pearson. To be satisfactory a regression equation for alpha or beta, and vice versa, must be serviceable for extrapolation.

This requirement is not consistent with the fact that regression parabolae commonly do not give admissible results as extrapolation formulae. On the other hand, a linear regression equation, if satisfactorily descriptive of observation may generally be trusted to give good extrapolated results for short distances at least beyond the ends of the range of observation. Thus, when the regression cubic for alpha on beta (fig. 1) fails completely as an extrapolation formula, Prof. Pearson considers a straight line as quite satisfactory even at rather great distances from the last observation point to which the line is fitted.

Since the skew relationship between alpha and beta total scores can be traced to the varying limitations of range of the separate alpha and beta tests, the problem of combination of tests can be dealt with most directly by starting from the interrelations of the separate tests, provided these form a linear system within the portions of the total range of intelligence common to the tests taken in all possible pairs.

Without making precise tests of the linearity of regression of each test on every other, we have considered that but slight errors would be made if we treated our system of variables as a linear one. Group X (see Chap. I, sec. 2, page 555) provides a set of data upon which to base the plan of analysis. For this sample at least we are able to drop the terms alpha and beta and deal with 16 variables (8 alpha tests, 7 beta tests, and Stanford-Binet mental age) instead of 3, gaining an approximately linear system at the expense of the increase in number of variables. We can immediately distribute the 1,047 cases of the experimental sample upon a scale of the sort we have already suggested for the common denominator for the various types of examination, viz, a scale of ratings obtained by summing scores in all tests; provided, however, that we treat zero scores, not impartially with other scores, but consider them rather as defects in the record, and that we supply values to substitute for them by means of multiple regression equations based on all the tests in which points are earned. Such a distribution might be reasonably regarded as descriptive of the intelligence of our sample measured by a nearly linear scale, i. e., a scale equal subdivisions of which correspond to approximately equal ranges of intelligence.

We can not here enter into a lengthy philosophical discussion of the significance of different types of frequency distribution for the linearity of the scales used in obtaining them, but one point needs to be considered. Equality of the successive segments of a scale may be defined in various ways. If we transpose some of the elements, say centimeters of a meter rule, we will obtain exactly the same measurements as before, whether we measure the length of bone, the height of plants, or the thickness of cakes of ice. This is true because the centimeter as a unit of measurement is definable quite independently of the laws of growth of bones or plants or of the physical conditions requisite to the freezing of ice. But the "unit" of measurement in a psychological test presents a fundamentally different situation. As an element in a quantitative scale of intelligence, or accuracy, or what not, it is definable solely in terms of the variable measured. Therefore, for an answer to the question whether a given scale of intelligence is linear, we lack, so to speak, a fixed point of reference. We may assume that intelligence in the unselected population is distributed normally, but we shall never get beyond assumption until we have a scale the "units" of which are equal, and demonstrably so, from other premises than our original assumption. On the other hand, since the frequency distribution of variates, the quantitative aspects of which depend upon a large number of partially independent and relatively small factors, is precisely the Gaussian normal curve, and since most psychological tests are anything but measures of specific, isolated types of reaction, but rather measures of reactions determined by a great number of partially or completely independent and, considered singly, almost insignificant factors, we might argue that in the case where an approximately normal distribution arises the "units" of the scale used are actually practically equal. The validity of this argument rests, of course, upon the correctness of our supposition in regard to the number, magnitude, and independence of the factors which determine the reactions measured. This is, in fact, the assumption from which we proceed in treating our system of 16 variables as a linear one. We consider that the frequency distributions of 13 out of the 16 variables suffi-

ciently approximate to the normal distribution (allowance being made of course for the proper distribution of inadequately measured or unmeasured cases) to permit us to treat their scales as linear and the regressions of the corresponding variables upon each other as linear. To be in accord with our assumption we must admit that the other three variables, beta tests 1 2, and 3, do not fit well into a linear system.

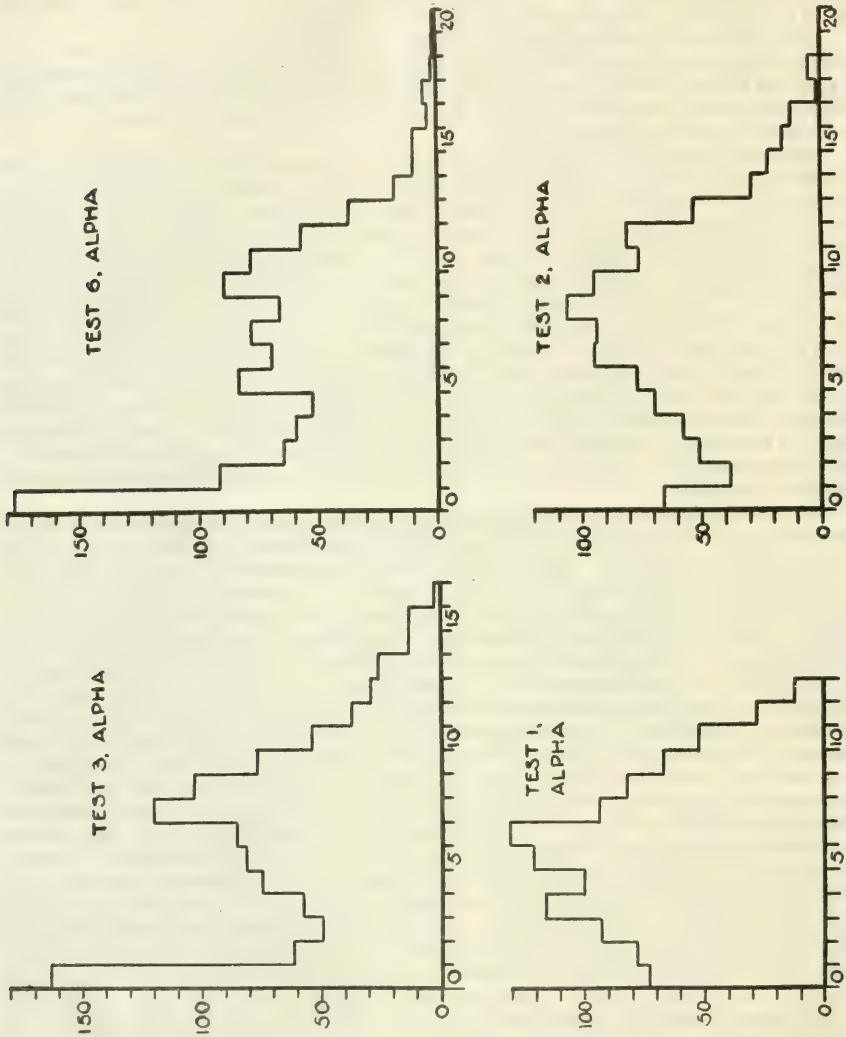

FIG. 3a. Histograms of scores in alpha tests. Special experimental Group X. 1,047 cases. Horizontal scale is score in test; vertical scale is number of cases.

We shall now consider somewhat more specifically the histograms of the various tests. It will be seen from mere inspection that none of the distributions of "class marks" except alpha 1 and 7 and beta 1 and 6 could be fitted satisfactorily by any type of Pearson frequency

curve. But allowing for the probable distribution of cases in the terminal class intervals (i. e., the distribution of these cases had they been as adequately measured as were all other cases), it is apparent that at least a moderately good fit by some type of Pearson curve[1] could be obtained for all distributions except that for beta 3. Such frequency curves, however, would be descriptive not of the distribution of class marks but of the distribution of the variate back of the class mark, i. e., of the distribution of intelligence as measured by different methods and

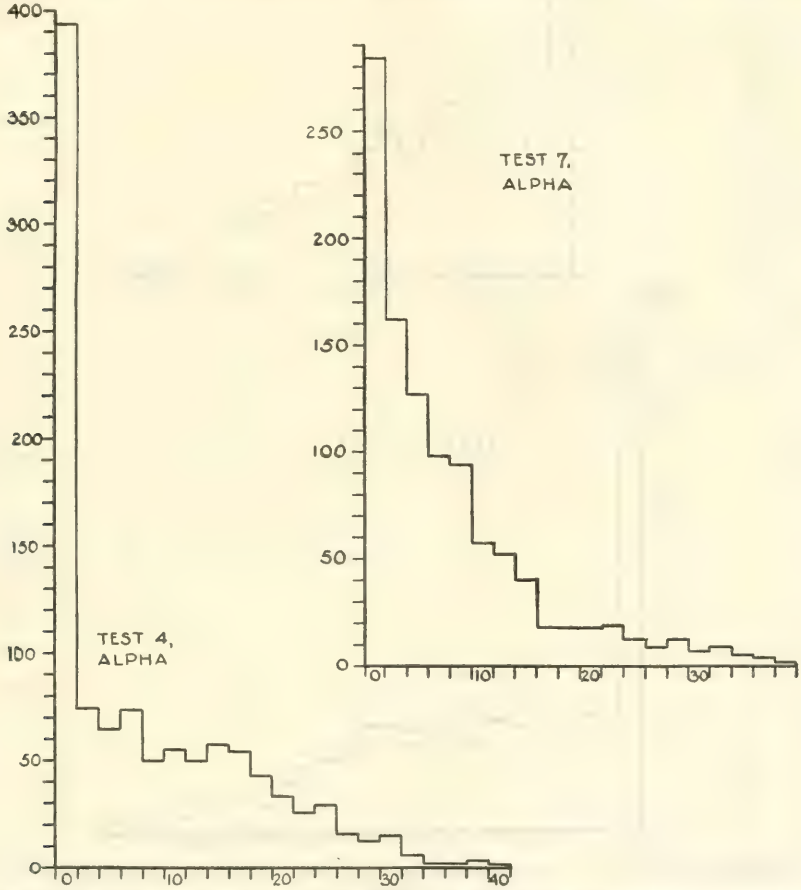

FIG. 3b. Histograms of scores in alpha tests. Special experimental Group X. 1,047 cases. Horizontal scale is score in test; vertical scale is number of cases.

quantitatively interpreted in different units. It is again evident that a distribution of total scores when such scores are merely sums of class marks can not be descriptive of the distribution of intelligence as measured by a linear, homogeneous scale.

Inspection of the histograms of the alpha tests (fig. 3) indicates how much the various tests differ in the length of range of ability measured. Tests 1 and 2 appear to be almost negli-

[1] Pearson, K., Skew Variation in Homogeneous Material, Phil. Trans., Series A, vol. 186, 1895, pp. 253ff.

gibly limited, and tests 4 and 7 extremely limited. Although the distribution of scores for test 7 might be easily fitted with a Pearson type J curve, it seems clear that this would be a sterile interpretation, for we can scarcely consider the type of reaction called for by test 7 to

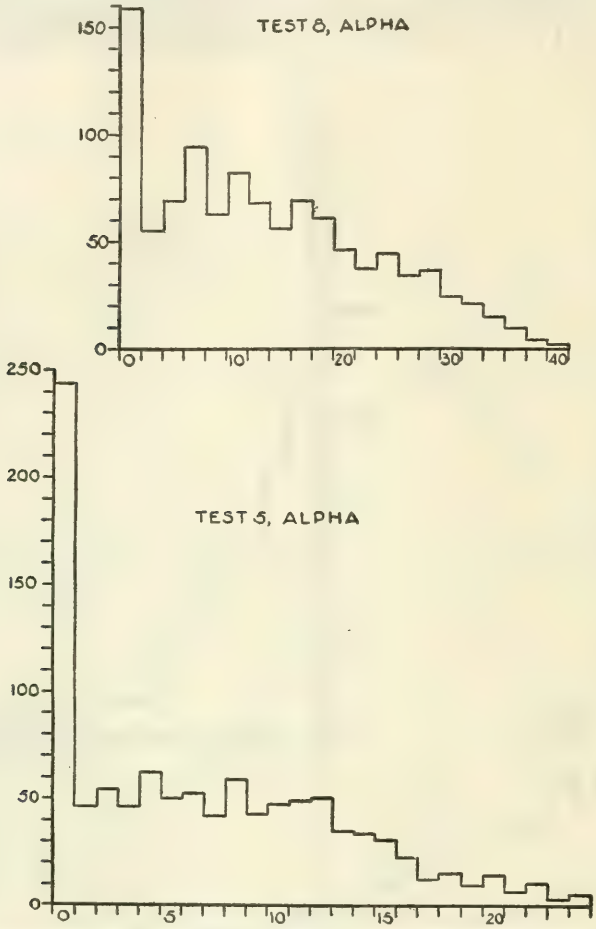

FIG. 3c. Histograms of scores in alpha tests. Special experimental Group X. 1,047 cases. Horizontal scale is score in test; vertical scale is number of cases.

be of such specific nature as to justify an interpretation of discontinuity of "function" that would be implied by the use of the type J curve. We must prefer to interpret all tests as different methods of measuring a rather general capacity, and the histogram of test 7 exactly as we interpret all others, as meaning incompleteness of the scale, in this case so extensive that only individuals of approximately average intelligence or better can earn points. Beta tests (Fig. 4) 4, 5, 6, and 7 give histograms interpretable along exactly the same lines. Beta 7 displays limitation of range at both ends. It may be remarked here that limitation of range may cause massing of cases not only in the terminal class interval, but even in the adjoining ones, in some

cases to the number of two or three. At the lower end of a scale this phenomenon is probably largely due to purely accidentally correct responses. The types of responses called for in the alpha and beta tests, viz. simple lines, crosses, etc., makes accidental scores of from 1 to 3 or 4 points in some tests quite possible for individuals whose ability may be much lower than the

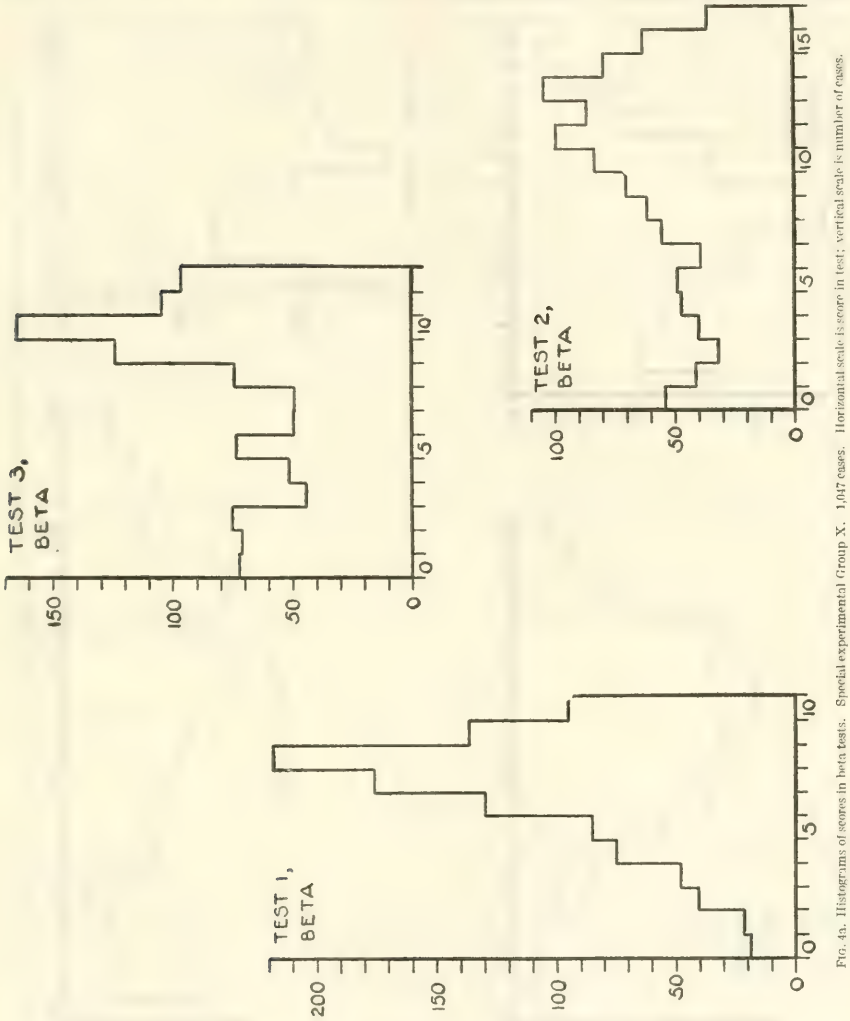

FIG. 4a. Histograms of scores in beta tests. Special experimental Group X. 1,047 cases. Horizontal scale is score in test; vertical scale is number of cases.

face value of such scores would indicate. In the case of limitation at the upper end of the scale massing of cases in the class interval next below the terminal one is accounted for by the fact that particular items in a test may present more than usual difficulty to some individuals. If a sufficient number of items of increasing difficultness are available, all individuals will automatically find their levels by adjusting the test to themselves. This adjustment is possible because

any item correctly responded to counts whether or not preceding items have elicited incorrect responses. Thus those individuals who reach the last item in a test, but who find there more than ordinary difficulty, are massed in the next lower class interval, although many may have had time to have done items on the average even more difficult had they been available. Thus the histogram of beta test 7 is accounted for.

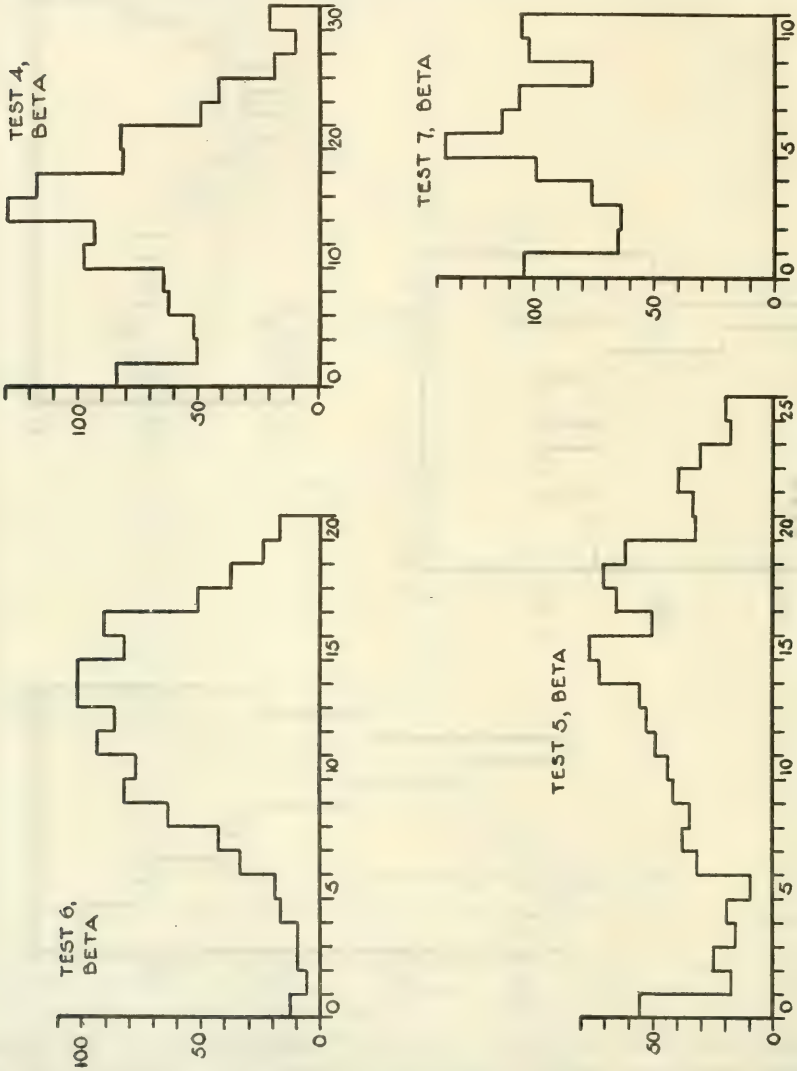

FIG. 4b. Histograms of scores in beta tests. Special experimental Group X. 1,047 cases. Horizontal scale is score in test; vertical scale is number of cases.

Beta test 1 shows a distribution very much skewed but giving no clear indication of the limitation of range displayed by many other tests. Beta 2 is similarly negatively skewed and also somewhat limited at the lower end of its range. Beta 3 defies interpretation.

On the basis of the interpretations outlined above we have considered that in the main the system of 16 variables might be treated as a linear one without doing serious violence to the facts. But its treatment even as a linear system requires a knowledge of means, standard deviations, and correlation coefficients that have been freed from the effect of incompleteness of range of the tests, for without such a set of constants we could scarcely provide the most probable negative scores to substitute for zero-scores. Given these constants we might obtain a total score in alpha and beta for every individual that would be directly comparable with those for all other individuals, because all would then be measurements upon a linear scale. We should therefore be able to eliminate most if not all of the skewness of the alpha total score distribution, likewise of the beta total score distribution, and consequently the skewness of the regression relationship between the two. For in all but a small number of cases alpha total scores could be built up within the eight tests. As we have seen, tests 1 and 2 are not seriously limited, and therefore very few cases fail to score at least 1 or 2 points in one or the other of these two tests, although failing in all others.

The fact that the distributions of 13 of the variables (8 alpha tests, beta tests 4, 5, 6, and 7, and Stanford-Binet mental age) do not diverge considerably from the normal form, provided we assume redistribution of unmeasured or inadequately measured cases, permits us to adopt a method of analysis based upon the normal correlation surface. The problem of calculating the correlation coefficients, and standard deviations and means that we require is the problem of obtaining these constants for a complete correlation surface in terms of the corresponding constants of a truncated correlation surface.

The equation of the normal frequency surface for two independent variables is:

$$z=\frac{N}{2\pi\sigma_x\sigma_y\sqrt{1-h^2}}e^{-\frac{1}{2(1-h^2)}\left(\frac{x^2}{\sigma_x^2}-\frac{2hxy}{\sigma_x\sigma_y}+\frac{y^2}{\sigma_y^2}\right)}$$

Let us consider the truncated portion of the surface included between the two planes $x=x_1$, $x=x_2$, and define a quantity, ρ for this portion of the surface thus:

$$\rho=\frac{p'_{11}}{(p'_{20}\,p'_{02})^{\frac{1}{2}}} \tag{1}$$

where p'_{11}, p'_{20} and p'_{02} are incomplete moments corresponding to the moments used in the ordinary definition of a coefficient of correlation:

$$r=\frac{p_{11}}{(p_{20}\,p_{02})^{\frac{1}{2}}}$$

After substituting

$$x'=\frac{x}{\sigma_x},\quad y'=\frac{y}{\sigma_y}$$

$$h=\frac{x_1}{\sigma_x},\quad k=\frac{x_2}{\sigma_x}$$

in the double integrals giving the incomplete moments required by (1) the equations take the following forms:

$$p'_{11}=\frac{N}{n}\frac{\sigma_x\sigma_y}{2\pi\sqrt{1-h^2}}\int_h^k\int_{-\infty}^{\infty}e^{-\frac{1}{2}x^2}ry\,dx\,dy-\frac{N}{n}\frac{\sigma_x}{2\pi\sqrt{1-h^2}}\int_h^k\int_{-\infty}^{\infty}e^{-\frac{1}{2}x^2}x\,dx\,dy\;\frac{N}{n}\frac{\sigma_y}{2\pi\sqrt{1-h^2}}\int_h^k\int_{-\infty}^{\infty}e^{-\frac{1}{2}x^2}y\,dx\,dy$$

$$p'_{20}=\frac{N}{n}\frac{\sigma_x^2}{2\pi\sqrt{1-h^2}}\int_h^k\int_{-\infty}^{\infty}e^{-\frac{1}{2}x^2}x^2\,dx\,dy-\left[\frac{N}{n}\frac{\sigma_x}{2\pi\sqrt{1-h^2}}\int_h^k\int_{-\infty}^{\infty}e^{-\frac{1}{2}x^2}x\,dx\,dy\right]^2$$

$$p'_{02}=\frac{N}{n}\frac{\sigma_y^2}{2\pi\sqrt{1-h^2}}\int_h^k\int_{-\infty}^{\infty}e^{-\frac{1}{2}x^2}y^2\,dx\,dy-\left[\frac{N}{n}\frac{\sigma_y}{2\pi\sqrt{1-h^2}}\int_h^k\int_{-\infty}^{\infty}e^{-\frac{1}{2}x^2}y\,dx\,dy\right]^2$$

Where

$$\chi^2 = x^2 - 2\mu xy + y^2$$

and

$$n = \frac{N}{2\pi\sqrt{1-h^2}} \int_h^k \int_{-\infty}^{\infty} e^{-\frac{1}{2}\chi^2} dx dy$$

n is the portion of the total population represented by the volume of the truncated correlation surface.

Simple integration by parts reduces these double integrals in such a way that upon substitution in (1) we obtain the following:

$$\rho = \frac{r(1+J)^{\frac{1}{2}}}{(1+r^2J)^{\frac{1}{2}}} \tag{2}$$

Where

$$J = \frac{\frac{h}{\sqrt{2\pi}} e^{-\frac{h^2}{2}} \quad \frac{k}{\sqrt{2\pi}} e^{\frac{k^2}{2}}}{\frac{1}{\sqrt{2\pi}} \int_h^k e^{-\frac{x^2}{2}} dx} - \left\{ \frac{\frac{e^{-\frac{h^2}{2}}}{\sqrt{2\pi}} - \frac{e^{-\frac{k^2}{2}}}{\sqrt{2\pi}}}{\frac{1}{2\pi} \int_h^k e^{-\frac{x^2}{2}} dx} \right\}^2 \tag{3}$$

or, in the notation of Sheppard's tables,

$$J = \frac{hz_h - kz_k}{n/N} - \left\{ \frac{z_h - z_k}{n/N} \right\}^2 \tag{4}$$

Since h is the lower limit of integration, it will be negative if less than half of the total population lie below it. Likewise, k will be positive unless more than half of the population is above it. Therefore J, which depends entirely upon the percentages of cases cut off at the upper and lower ends of the distribution of x-variates, can be readily determined by the aid of Sheppard's tables, and will always be negative.

From (2) we now get the following equation expressing r, the correlation coefficient of the complete surface, in terms of s the analogous quantity derived from the incomplete surface, and of the percentages of cases beyond the stumps of the distribution of x-variates (if the surface be a truncated normal surface):

$$r = \frac{\rho}{\sqrt{1 + (1 - s^2)J}} \tag{5}$$

If the distribution of the x-variate is truncated at one end only, say the lower, so that k is infinite, we have

$$J = \frac{hz_h}{\frac{1}{2}(1+\alpha)} - \left\{ \frac{z_h}{\frac{1}{2}(1+\alpha)} \right\}^2$$

The complete distribution of x-variates is given by the equation

$$Z = \frac{N}{\sigma_x\sqrt{2\pi}} e^{-\frac{x^2}{2\sigma_x^2}}$$

If we find the standard deviation of the truncated portion formed by cutting off the lower tail at the point x_1, so that $x_1/\sigma_x = h$, we have:

$$nm_2 = \frac{N\sigma_x^2}{\sqrt{2\pi}} \int_h^{\infty} e^{-\frac{x^2}{2}} x^2 dx$$

$$= \frac{N\sigma_x^2}{\sqrt{2\pi}} \left\{ he^{-\frac{h^2}{2}} + \int_h^{\infty} e^{-\frac{x^2}{2}} dx \right\}$$

$$nm_1 = \frac{N\sigma_x}{\sqrt{2\pi}} \int_h^{\infty} e^{-\frac{x^2}{2}} x dx$$

$$= N\sigma_x \frac{e^{-\frac{h^2}{2}}}{\sqrt{2\pi}}$$

$$s_x^2 = m_2 - m_1^2$$

$$= \sigma_x^2 \left\{ \frac{\dfrac{he^{-\frac{h^2}{2}}}{\sqrt{2\pi}}}{\dfrac{1}{\sqrt{2\pi}}\displaystyle\int_h^\infty e^{-\frac{x^2}{2}}dx} + 1 - \left[\frac{\dfrac{e^{-\frac{h^2}{2}}}{\sqrt{2\pi}}}{\dfrac{1}{\sqrt{2\pi}}\displaystyle\int_h^\infty e^{-\frac{x^2}{2}}dx} \right]^2 \right\}$$

$$= \sigma_x^2 \left\{ 1 + \frac{hz_h}{\frac{1}{2}(1+\alpha)} - \left[\frac{z_h}{\frac{1}{2}(1+\alpha)} \right]^2 \right\}$$

Therefore

$$\frac{s_x^2}{\sigma_x^2} = 1 + J$$

$$J = \frac{s_x^2}{\sigma_x^2} - 1$$

If we substitute this value of J in (2) we obtain

$$\rho = \frac{s_x}{\sigma_x} \frac{r}{\sqrt{1 - \left(1 - \frac{s_x^2}{\sigma_x^2}\right) r^2}}$$

which is the formula derived by Prof. Pearson [1] showing the effect of selection upon the correlation between two measurements of the selected sample. It is evident, therefore, that the use of formula (5) is merely a device for proceeding from the correlation within a selected population to that for an unselected population, the standard deviation of the directly selected variates, s being given by the data, and the corresponding standard deviation of the total population, σ, being approximately determinable by the use of Sheppard's tables, if the distribution of variates does not diverge widely from the normal.

Besides the correlation coefficients for all pairs of variables, we need to know the mean and standard deviation of each distribution. The following formulæ are readily deducible from the normal correlation surface. If t is the variable corresponding to the truncated distribution and n is the variable of the nontruncated distribution, we have:

$$\sigma_t = \frac{s_t}{\sqrt{1+J}}$$

$$\sigma_n = \frac{s_n}{\sqrt{1+r^2 J}} = \frac{s_n\sqrt{1+(1-s^2)J}}{\sqrt{1+J}}$$

$$= \frac{\rho}{r} \cdot \frac{s_n}{s_t} \cdot \sigma_t$$

$$M_n = m_n - r\sigma_n \left\{ \frac{z_h - z_k}{n/N} \right\}$$

$$M_t = m_t - \sigma_t \left\{ \frac{z_h - z_k}{n/N} \right\}$$

where s and m are respectively the standard deviation and mean of the incomplete distribution, and σ and M are the corresponding moments of the hypothetically complete distribution. The symbols z_h, z_k, and n/N have the same significance as in formula (4). With the aid of these formulæ we are enabled to obtain the desired constants from all but eighteen of our correlation tables. Although many more than eighteen are obviously truncated with respect to both scales, we are able to avoid the necessity of treating them as such by cutting the table higher in one scale than its limitation alone would require. Moreover, the unreliability of

[1] Pearson, K., On the Influence of Natural Selection on the Variability and Correlation of Organs, Phil. Trans., Series A, vol. 200, 1903, pp. 1ff

frequencies in the lowest three or four class intervals for many of the tests, due to accidental scores, as pointed out above, seems to warrant cutting them off along with the zero-arrays. This procedure is especially valid in the case of alpha tests 3, 6, and 7. On the other hand, owing to the fact that the score in alpha test 4 is obtained by subtracting the number of wrong items from the number of right ones, accidental scores practically do not exist, and the lowest array only needs to be cut off. In no case have we based our constants upon less than half of the total population.

In order to make the above procedure perfectly clear the arithmetic involved in applying the method to a sample table is here given. Take for an example the contingency table of alpha test 4 and alpha test 8, Table 52. It is obvious from the table that there is an enormous piling up of cases in the zero class interval on the alpha test 4 variable. So we eliminate this first array entirely and treat the remainder of the table as though it had never been there. We have now cut out 393 cases, leaving 654 of the 1,047, or 62.46 per cent. This 62.46 per cent is the truncated surface, from which we calculate ρ, s_n, and s_t. In this case alpha test 4 is the truncated variable, so we have for $s_t = 4.0109$ and for $s_n = 4.5261$; these two standard deviations are calculated in the usual straightforward way. The calculation of the product moment is also straightforward, and is in this case 13.5394. Thus ρ is $\frac{13.5394}{(4.0109)(4.5261)} = 0.7458$

J is calculated in the following way: In this case we are dealing with 62.46 per cent of the cases, i. e., $\frac{n}{N}$ is 0.6246. If we turn now to Sheppard's tables [1] and look up 0.6246 in the column headed "Permille," we find the entry in the table corresponding to 0.624 to be 0.3160. Then by making the proper interpolation for our fourth decimal place we get 0.3175. This quantity is negative and is "h." To find "z_h," we turn over to Table II (same volume) and look up 0.3175 in the column headed "x," and the corresponding entry in the column headed "z" is the required quantity. After making the proper interpolation for the third and fourth decimal place we have "z_h" equal to 0.3793327. From this point on the work is simply a matter of substitution in the various formulæ given above.

By substituting $\frac{n}{N}$, h, and z_h in the formula for J we have:

$$J = \left(\frac{-(0.3175)(0.3793327)}{0.6246}\right) - \left(\frac{0.3793327}{0.6246}\right)^2 - 0.5616632$$

Then by substituting J and ρ and ρ^2 in the proper formula we get r:

$$r = \frac{0.7458}{\sqrt{1 + (1 - 0.5562)(-0.5616632)}} = 0.8608$$

We therefore consider 0.8608 to be the correlation between *variable* alpha 4 and *variable* alpha 8, as exhibited in our sample. It should be remembered that in applying this method we have not cut off 393 cases and thrown them away, but have redistributed them in accordance with the normal correlation surface. Our calculations have been made from all the cases. For the relative size of ρ and r depends on the size of J, which in turn is large or small as we cut off large or small numbers. In applying this method to the contingency tables (Tables 10 to 154) an effort was made in each case to remove sufficient cases to relieve the jamming (i. e., the piling up of cases in the extreme arrays), yet at the same time to leave as many cases in the truncated portion as possible. A large number of the tables are jammed on one side only. These are simple to deal with, for all that is necessary is to cut off the array or arrays in which the cases are piled up. Other tables show jamming on two sides; still others are jammed on three sides. In cutting tables which exhibit jamming on two adjacent sides an effort was made to remove enough cases to relieve the jam on each of the variables. In tables like the one for alpha 3 and beta 7 (Table 48), which show jamming on three sides, the J method was abandoned and the method of tetrachoric functions employed. This method is fully described in Pearson's

[1] Table No. I in "Tables for Statisticians and Biometricians," by Karl Pearson, 1914.

"Tables for Statisticians and Biometricians," where tables for its use are given. Our contingency tables, therefore, with respect to the jamming or limitations of the scales range all the way from such tables as alpha 1 and beta 6 (Table 22), in which there is no jamming, to tables like alpha 6 and beta 7 (Table 78), which is jammed on three sides. As indicated above, no general method was applied, but each table was treated according to its own peculiarities and limitations. Thus in curtailing these correlation surfaces two things were taken into account, (1) the shape of the distribution of the two test scores, and (2) the way in which they were disposed or scattered in the table. In the first cases it seemed desirable to eliminate all, or nearly all, of the zero scores. In some cases scores of 1 or 2 were eliminated with the zeros. Further an effort was made to cut each distribution in such a place that if a normal curve were fitted to the stump the number of cases cut off would just fill up the place provided for them by the curve. This ideal condition was not always attained. It could have been attained had it not been for the fact that it was just as necessary to consider the peculiar limitations of each table separately, for in cutting a table an effort was made to cut deep enough so that the arrays of the noncut variable would be nearly symmetrical. Thus it was necessary to cut a given distribution in various places according to the distribution with which it was paired in a table. In the table below when a distribution appears to be cut twice (each time below the mean) it means that it was sometimes cut at one place and sometines at another, according to the requirements of the table. Beta 7 was regularly cut twice in all tables above and below the mean. This test shows decided limitations at both ends, and hence the first two and last two class intervals were cut off and redistributed.

Test.	Place cut in class marks.	$\frac{n}{N}$
Alpha 1[1]	Between 1 and 2	0.8558
Alpha 2	Between 0 and 1	.9369
Alpha 2	Between 1 and 2	.9007
Alpha 3	Between 1 and 2	.7860
Alpha 3	Between 2 and 3	.7392
Alpha 4	Between 0 and 2	.6246
Alpha 5	Between 0 and 1	.7669
Alpha 5	Between 2 and 3	.6714
Alpha 6	Between 2 and 3	.6829
Alpha 7	Between 0 and 2	.7827
Alpha 7	Between 2 and 4	.5740
Alpha 8	Between 0 and 2	.8481
Beta 1	Not cut at all	
Beta 2	Between 1 and 2	.9033
Beta 3	Not cut because of very peculiar distribution (see fig. 4)	
Beta 4	Between 0 and 2	.9198
Beta 5	Between 5 and 6	.8672
Beta 6	Not cut at all (see fig. 4)	
Beta 7	Between 1 and 2	.6410
Beta 7	Between 8 and 9	

[1] This test was cut in but one table.

The means and standard deviation used in this study were obtained by taking an arithmetical average of all the possible means and standard of any given variable calculated directly and indirectly. By "directly" we mean calculated from the truncated distribution. By "indirectly" we mean the mean or standard deviation for any given variable calculated from the correlation of that variable with other variables, when the variable in question is always the nontruncated one. It is clear that if a correlation surface is truncated along one variable the mean and standard deviation of the nontruncated variable can be obtained from the correlation. The formulæ for making these calculations have already been given immediately above.

In some surfaces both variables were truncated and in other surfaces neither was truncated. In all cases, however, in which neither or both variables were truncated we did not calculate means or standard deviations indirectly. This fact will explain some apparent gaps in the following tables. Other apparent gaps in the tables can be accounted for if note is taken of the fact that in these tables the variable (i. e., test) in question is always the nontruncated one.

TABLE 155.—*Coefficients of correlation for all possible pairs of variables dealt with. For method of calculation see text.*

	Alpha test.								Beta test.							Stanford-Binet mental age.	Alpha total score.	Beta total score.
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7			
Alpha tests:																		
1	1	.7304	.5897	.7093	.6862	.6802	.6697	.6584	.4213	.5764	.5920	.6286	.5600	.5428	.5536	.6810	.7729	.6900
2	.7304	1	.7455	.7915	.7634	.7730	.7357	.7425	.4437	.5979	.6591	.6823	.6425	.5673	.5228	.7788	.8445	.7236
3	.5897	.7455	1	.8055	.7543	.6129	.6714	.7750	.3641	.4477	.5269	.6795	.5982	.5451	.5827	.6932	.8609	.6957
4	.7093	.7915	.8055	1	.8343	.6814	.7304	.8608	.4274	.4948	.5690	.6422	.5455	.5595	.5412	.8240	.9373	.6831
5	.6862	.7634	.7543	.8343	1	.6736	.7784	.8227	.4091	.5306	.5544	.6388	.5809	.5589	.4972	.7219	.8974	.6919
6	.6802	.7730	.6129	.6814	.6736	1	.7036	.6930	.4294	.5918	.6046	.6003	.6055	.5273	.6039	.7109	.8405	.7369
7	.6697	.7357	.6714	.7304	.7784	.7036	1	.6718	.4231	.4724	.5589	.6276	.5569	.4890	.5491	.7261	.8769	.6814
8	.6584	.7425	.7750	.8608	.8227	.6930	.6718	1	.3670	.4585	.5761	.6663	.5804	.6076	.5379	.7158	.9289	.7001
Beta tests:																		
1	.4213	.4437	.3641	.4274	.4091	.4294	.3231	.3670	1	.4844	.4957	.4795	.4082	.5011	.5050	.4650	.4460	.6190
2	.5764	.5979	.4477	.4948	.5306	.5978	.4024	.4585	.4844	1	.6272	.5493	.5187	.5702	.5849	.6108	.4373	.7889
3	.5920	.6591	.5269	.5690	.5544	.6046	.5589	.5761	.4957	.6272	1	.6796	.6465	.5878	.5764	.6140	.6176	.8215
4	.6286	.6823	.6795	.6422	.6388	.6003	.6276	.6663	.4795	.5493	.6796	1	.7520	.6438	.5634	.6571	.6418	.8876
5	.5600	.6425	.5982	.5455	.5809	.6055	.5568	.5804	.4082	.5187	.6465	.7520	1	.5629	.5523	.6080	.7027	.8377
6	.5428	.5673	.5451	.5595	.5589	.5273	.4890	.6076	.5011	.5702	.5878	.6438	.5629	1	.5694	.5860	.5135	.7808
7	.5536	.5228	.5827	.5412	.4972	.6039	.5491	.5379	.5050	.5849	.5764	.5634	.5523	.5694	1	.6026	.5872	.7313
Stanford-Binet mental age	.6810	.7788	.6932	.8240	.7219	.7109	.7261	.7158	.4650	.6108	.6140	.6571	.6080	.5860	.6026	1	.8111	.7270
Alpha total score	.7729	.8445	.8609	.9373	.8974	.8405	.8769	.9289	.4460	.4373	.6176	.6418	.7027	.5135	.5872	.8111	1	X
Beta total score	.6900	.7236	.6957	.6831	.6919	.7369	.6814	.7001	.6190	.7889	.8215	.8876	.8377	.7808	.7313	.7270	X	1

TABLE 156.—*Showing the means and standard deviations used in this study and how they were obtained.*

[The left-hand column tells how the entries in the two corresponding columns were calculated. In all cases in which they were calculated indirectly from the correlations the variable in question is the nontruncated variable. A double-entry means that the variable in question was cut in different places on different occasions. All means and standard deviations are the terms of class intervals unless otherwise stated. In this and succeeding tables the various tests of alpha will be designated as A_1, A_2, etc.; the tests of beta as B_1, B_2, etc.; the total score of alpha and beta as A_t and B_t.]

	Mean.	Standard deviation.
Alpha test 1.		
Calculated from:		
Truncated distribution	5.466	3.041
Correlation with A_2	5.827	2.938
Correlation with A_4	5.504	3.155
Correlation with A_5	5.598	3.290
Correlation with A_6	5.563	3.113
Correlation with A_7	5.382	3.278
Correlation with A_8	5.594	3.078
Correlation with B_2	5.449	3.139
Correlation with B_4	6.504	3.117
Correlation with B_5	5.608	3.049
Correlation with B_7	5.413	2.458
Correlation with A_1	5.829	3.092
Correlation with A_t	6.497	2.894
Average	5.6334	3.0491
Alpha test 2.		
Calculated from:		
Truncated distribution	7.891	3.854
Truncated distribution	7.564	4.104
Correlation with A_1	7.543	4.100
Correlation with A_3	7.696	3.970
Correlation with A_4	7.476	4.100
Correlation with A_5	7.317	4.184
Correlation with A_6	7.515	4.103
Correlation with A_7	7.418	4.153
Correlation with A_8	7.717	3.923
Correlation with B_5	7.679	3.974
Correlation with B_7	7.423	3.886
Correlation with A_1	7.872	3.474
Correlation with A_t	8.690	3.534
Average	7.6277	3.9508
Alpha test 3.		
Calculated from:		
Truncated distribution	6.125	4.135
Truncated distribution	6.207	4.034
Correlation with A_4	6.142	3.793
Correlation with A_7	6.319	3.914
Correlation with A_8	6.746	3.639
Average	6.3077	3.9029

	Mean.	Standard deviation.
Beta test 1.		
Calculated from:		
Correlation with A_2	7.117	2.368
Correlation with A_3	7.234	2.266
Correlation with A_4	7.132	2.279
Correlation with A_5	7.052	2.374
Correlation with A_6	7.219	2.281
Correlation with A_7	7.233	2.187
Correlation with A_8	7.216	2.306
Correlation with B_2	7.113	2.394
Correlation with B_4	7.170	2.333
Correlation with B_5	7.206	2.289
Correlation with B_7	7.078	2.458
Correlation with A_1	7.309	2.076
Correlation with A_t	7.643	2.122
Average	7.2094	2.2872
In points	3.6047	1.1436
Beta test 2.		
Calculated from:		
Truncated distribution	9.566	4.501
Correlation with A_3	9.847	4.328
Correlation with A_5	9.403	4.279
Correlation with A_6	9.577	4.431
Correlation with A_7	10.047	4.227
Correlation with A_8	9.732	4.407
Correlation with B_4	9.527	4.546
Correlation with B_5	9.641	4.665
Correlation with B_7	9.563	4.811
Correlation with A_t	10.12	3.700
Average	9.7103	4.3895
Beta test 3.		
Calculated from:		
Correlation with A_1	7.493	3.782
Correlation with A_2	7.364	3.907
Correlation with A_3	7.783	3.582
Correlation with A_4	7.665	3.591
Correlation with A_5	7.306	3.999
Correlation with A_6	7.848	3.463
Correlation with A_7	7.750	3.508
Correlation with A_8	7.551	3.759
Correlation with B_2	7.353	3.904
Correlation with B_4	7.373	3.898
Correlation with B_7	7.524	4.027
Correlation with A_1	8.712	3.278
Correlation with A_t		3.950
Average	7.6435	3.7429

TABLE 156.—*Showing the means and standard deviations used in this study and how they were obtained*—Continued.

	Mean.	Standard deviation.
Alpha test 4.		
(Since alpha test 4 was truncated in all correlation tables, we only have the mean and standard deviations as calculated from the truncated distribution	3.0767	6.0581
In points	6.1414	12.1162
Alpha test 5.		
(The same situation exists here as in the case of alpha test 4)	6.5089	7.3823
Alpha test 6.		
Calculated from:		
Truncated distribution	6.425	4.505
Correlation with A_3	6.249	4.333
Average	6.3371	4.4192
Alpha test 7.		
(Same situation as in tests 4 and 5)	2.3389	5.6857
In points	4.6779	11.3714
Alpha test 8.		
Calculated from:		
Truncated distribution	6.367	5.635
Correlation with A_4	5.896	5.923
Correlation with A_6	6.554	5.235
Correlation with A_7	5.870	4.569
Average	6.1716	5.3408
In points	12.3433	10.6816

	Mean.	Standard deviation.
Beta test 4.		
Calculated from:		
Truncated distribution	6.862	3.818
Correlation with A_3	7.010	3.665
Correlation with A_5	6.707	3.767
Correlation with A_6	7.144	3.508
Correlation with A_7	7.131	3.507
Correlation with B_7	6.935	3.574
Correlation with A_4	8.178	3.365
Average	7.1389	3.6650
In points	14.2779	7.2010
Beta test 5.		
Calculated from:		
Truncated distribution	14.069	6.0212
Correlation with A_4	14.462	5.782
Correlation with A_6	14.338	5.832
Correlation with A_7	14.807	5.425
Correlation with B_7	14.057	6.078
Average	14.1466	5.9476
Beta test 6.		
(Since the distribution of this test is nearly symmetrical and since there are no piling up of cases, the mean and standard deviations of the distribution as it stands were used)	12.4198	4.1223
Beta test 7.		
This test, like alpha 4, 5, and 7, was truncated in all correlation tables. From the truncated distribution	5.4895	3.4522

The mental age distribution was treated in the same way as beta test 6. Since there is no piling up of cases in the extreme class intervals, the mean and standard deviations were taken at their face value. They are: Mean, 53.6912 (in quarter years); standard deviations, 11.3848.

The means for the alpha total, beta total, and combined scale distributions were obtained by summing the means of the component tests. The standard deviations for the totals, alpha and beta, and the combined scale were calculated from the standard deviations of the component tests and from the intercorrelations by the formula given in Yule's Theory of Statistics, page 211. These means and standard deviations are listed in the table below.

	Mean.	Standard deviation.
Alpha total (in points)	55.5774	50.404
Beta total (in points)	67.2920	26.170
Mental age (in quarter-fourth years)	53.6912	11.385
Combined scale (in points)	172.559	81.118

From the set of correlation coefficients, standard deviations, and means thus obtained it is possible to form multiple regression equations connecting any set of variables we choose, and therefore values can be obtained to substitute for all zero scores. A rating on the combination scale defined above can therefore be obtained for every individual in our experimental sample, and the distribution of these ratings should give us a much more nearly correct picture of the distribution of intelligence than does the distribution to total beta scores, or total alpha scores, or of Stanford-Binet mental ages. Similarly, in the case of individuals who have had

alpha only, or beta only, or individual examination only, we might calculate the most probable scores on the combined scale from the points actually earned in the examination taken. Such procedure would require a great variety of regression equations to fit all of the combinations of scores that are to be found, and would prove an interminable task if attempted for the principal sample.

A different procedure is therefore necessitated. The principal sample is already tabulated according to total scores in the various forms of examination and combinations of them; hence, the problem is one of combining distributions—i. e., one of manipulating masses instead of individuals. Since the only data of the principal sample are those given by distribution of total scores, in which scores in component tests are entirely submerged, it might appear that, so far as the principal sample is concerned, we have gained nothing by our analysis of the experimental group. But we have seen how the limitations of range of the component tests of alpha and beta effect the distribution of total scores, and that individuals in the lowest class intervals do not score in general in all the tests, but in different combinations of them, depending upon their ability. Now if it is possible to analyze total scores typical of each class interval into their typical components we shall still be able to make use of our linear system.

For normal correlation[1] the frequency "surface" for n variables is:

$$Z = \frac{N}{(2\pi)^{\frac{n}{2}}\sigma_1\sigma_2\sigma_3 \cdot \cdot \cdot \sigma_n\sqrt{R_{oo}}} e^{-\frac{1}{2}\cdot\frac{1}{R}\left\{S\frac{R_{pp}x_p^2}{\sigma_p^2}+2S'\frac{R_{pq}x_px_q}{\sigma_q\sigma_q}\right\}}$$

where R is the determinant

$$\begin{vmatrix} 1 & r_{12} & r_{13} & r_{14} & r_{15} & \cdot & \cdot & \cdot & r_{1n} \\ r_{21} & 1 & r_{23} & r_{24} & r_{25} & \cdot & \cdot & \cdot & r_{2n} \\ r_{31} & r_{32} & 1 & r_{34} & r_{35} & \cdot & \cdot & \cdot & r_{3n} \\ & & & & & \cdot & \cdot & \cdot & \\ & & & & & \cdot & \cdot & \cdot & \\ r_{n1} & r_{n2} & r_{n3} & r_{n4} & r_{n3} & \cdot & \cdot & \cdot & 1 \end{vmatrix}$$

and R_{pq} is the minor with its proper sign of the element in the pth row and qth column of this determinant. We wish to determine the typical values of the variables $x_1, x_2, x_3, x_4 \cdot \cdot \cdot x_n$ for a given value of their sum. This typical set of values will be that which gives the maximum frequency for the given sum, or, what amounts to the same thing, makes

$$\frac{1}{R}\left\{S\frac{R_{pp}x_p^2}{\sigma_p^2}+2S'\frac{R_{pq}x_px_q}{\sigma_p\sigma_q}\right\}$$

a minimum, after substituting for one of the variables, say, x_1, its value when the sum of all the quantities x is fixed, and equal to d:

$$x_1 = d - x_2 - x_3 - x_4 \cdot \cdot \cdot - x_n$$

Differentiation with respect to each variable in turn, after making this substitution, gives n–1 simultaneous linear equations, of which the following is typical:

$$\left\{\frac{R_{11}}{\sigma_1^2}-\frac{R_{11}}{\sigma_1\sigma_1}-\frac{R_{12}}{\sigma_1\sigma_2}+\frac{R_{21}}{\sigma_2\sigma_1}\right\}x_2+\left\{\frac{R_{11}}{\sigma_1^2}-\frac{R_{11}}{\sigma_1\sigma_1}-\frac{R_{13}}{\sigma_1\sigma_3}+\frac{R_{31}}{\sigma_3\sigma_1}\right\}x_3+ \cdot \cdot \cdot$$

$$+ \cdot \cdot \cdot + \left\{\frac{R_{11}}{\sigma_1^2}-\frac{R_{11}}{\sigma_1\sigma_1}-\frac{R_{1n}}{\sigma_1\sigma_n}+\frac{R_{n1}}{\sigma_n\sigma_1}\right\}x_n = \left\{\frac{R_{11}}{\sigma_1^2}-\frac{R_{11}}{\sigma_1\sigma_1}\right\}d.$$

[1] We are not assuming a normal system of variates. We could readily determine by precise tests whether our data represent a normal system. As a matter of fact, they do not. But we do make the assumption that our system approximates to the normal sufficiently to permit us to treat it as such without introduction of serious error.

Solving these equations for x_1, x_2, etc., we obtain the following results:

$$\frac{x_1}{\sigma_1}=\frac{d\begin{vmatrix}\sigma_1 & R_{12} & R_{13} & \cdot & \cdot & \cdot & R_{1n}\\ \sigma_2 & R_{22} & R_{23} & \cdot & \cdot & \cdot & R_{2n}\\ \sigma_3 & R_{33} & R_{33} & \cdot & \cdot & \cdot & R_{3n}\\ \sigma_4 & R_{43} & R_{43} & \cdot & \cdot & \cdot & R_{4n}\\ & & & \cdot & \cdot & \cdot & \\ & & & \cdot & \cdot & \cdot & \\ \sigma_n & R_{n3} & R_{n3} & \cdot & \cdot & \cdot & R_{nn}\end{vmatrix}}{\Delta},$$

$$\frac{x_2}{\sigma_2}=\frac{d\begin{vmatrix}\sigma_1 & R_{11} & R_{13} & R_{14} & \cdot & \cdot & \cdot & R_{1n}\\ \sigma_2 & R_{21} & R_{23} & R_{24} & \cdot & \cdot & \cdot & R_{2n}\\ \sigma_3 & R_{31} & R_{33} & R_{34} & \cdot & \cdot & \cdot & R_{3n}\\ \sigma_4 & R_{41} & R_{43} & R_{44} & \cdot & \cdot & \cdot & R_{4n}\\ & & & & \cdot & \cdot & \cdot & \\ & & & & \cdot & \cdot & \cdot & \\ \sigma_n & R_{n1} & R_{n2} & R_{n4} & \cdot & \cdot & \cdot & R_{nn}\end{vmatrix}}{\Delta},$$

$$\frac{x_3}{\sigma_3}=\frac{d\begin{vmatrix}\sigma_1 & R_{11} & R_{12} & R_{14} & \cdot & \cdot & \cdot & R_{1n}\\ \sigma_2 & R_{21} & R_{22} & R_{24} & \cdot & \cdot & \cdot & R_{2n}\\ \sigma_3 & R_{31} & R_{32} & R_{34} & \cdot & \cdot & \cdot & R_{3n}\\ & & & & \cdot & \cdot & \cdot & \\ & & & & \cdot & \cdot & \cdot & \\ \sigma_n & R_{n1} & R_{n2} & R_{n4} & \cdot & \cdot & \cdot & R_{nn}\end{vmatrix}}{\Delta},$$

etc.

$$\text{where } \Delta=\begin{vmatrix}O & \sigma_1 & \sigma_2 & \sigma_3 & \cdot & \cdot & \cdot & \sigma_n\\ \sigma_1 & R_{11} & R_{12} & R_{13} & \cdot & \cdot & \cdot & R_{1n}\\ \sigma_2 & R_{21} & R_{22} & R_{23} & \cdot & \cdot & \cdot & R_{2n}\\ \sigma_3 & R_{31} & R_{32} & R_{33} & \cdot & \cdot & \cdot & R_{3n}\\ & & & & \cdot & \cdot & \cdot & \\ & & & & \cdot & \cdot & \cdot & \\ \sigma_n & R_{n1} & R_{n2} & R_{n3} & \cdot & \cdot & \cdot & R_{nn}\end{vmatrix}$$

Further reduction leads to:

$$\left.\begin{aligned}\frac{x_1}{\sigma_1}&=\frac{(\sigma_1+r_{12}\sigma_2+r_{13}\sigma_3+r_{14}\sigma_4+\ \cdot\ \cdot\ \cdot\ +r_{1n}\sigma_n)d}{\Sigma^2}\\ \frac{x_2}{\sigma_2}&=\frac{(r_{21}\sigma_1+\sigma_2+r_{23}\sigma_3+r_{24}\sigma_4+\ \cdot\ \cdot\ \cdot\ +r_{2n}\sigma_n)d}{\Sigma^2}\\ \frac{x_3}{\sigma_3}&=\frac{(r_{31}\sigma_1+r_{32}\sigma_2+\sigma_3+r_{34}\sigma_4+\ \cdot\ \cdot\ \cdot\ +r_{3n}\sigma_n)d}{\Sigma^2}\end{aligned}\right\}\qquad(6)$$

where

$$\Sigma^2=\overset{n}{\underset{i=1}{S}}(\sigma_i^2)+2S'(r_{ij}\sigma_i\sigma_j)$$

S' being a double summation for all pairs of values of i and j from 1 to n, except $i=j$. These are very simple results, for if

$$X=x_1+x_2+x_3+\ \cdot\ \cdot\ \cdot\ x_n$$

it is easily shown that

$$r_{x_1}X=\frac{\sigma_1+r_{12}\sigma_2+r_{13}\sigma_3+r_{14}\sigma_4+\ \cdot\ \cdot\ \cdot\ r_{1n}\sigma_n}{\Sigma}$$

and that

$$\sigma X=\Sigma$$

Therefore the results in equations (6) are merely the values of x_1, x_2, etc., given by the following regressions of x_1, x_2, on their sum, for the special case of the sum equal to d.

$$\frac{x_1}{\sigma_1}=r_{x_1}X\frac{X}{\Sigma}$$

$$\frac{x_2}{\sigma_2}=r_{x_2}X\frac{X}{\Sigma},\text{ etc.}$$

We shall now apply these results to the problem of analyzing typical scores in each class interval of a distribution of total scores. Since x_1, x_2, x_3, etc., in the above formulæ are distances from their respective means, d is the difference between their sum and the sum of their means.

TABLE 157.—*Showing the scores in each alpha and beta test and in mental age in terms of standard deviations.*

The table reads as follows: 2.0 S. D. above the mean is 11.73 points in alpha test 1, 15.53 in alpha test 2, 14.11 in alpha test 3, and so on.

Standard deviation.	Alpha test 1.	Alpha test 2.	Alpha test 3.	Alpha test 4.	Alpha test 5.	Alpha test 6.	Alpha test 7.	Alpha test 8.	Beta test 1.	Beta test 2.	Beta test 3.	Beta test 4.	Beta test 5.	Beta test 6.	Beta test 7.	Mental age in one-fourth years.
3.2	.....	20.27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3.1	.....	19.87	.....	.....	.....	20.04	39.93	.....	.....	.....	.....	.....	.....	.....	.....	.....
3.0	.....	19.48	.....	.....	.....	19.59	38.79	.....	.....	.....	.....	.....	.....	.....	.....	.....
2.9	.....	19.08	.....	.....	.....	19.15	37.65	.....	.....	.....	.....	.....	.....	.....	.....	.....
2.8	.....	18.69	.....	40.07	.....	18.71	36.52	.....	.....	.....	.....	.....	.....	.....	.....	.....
2.7	.....	18.29	.....	38.85	.....	18.27	35.38	.....	.....	.....	.....	.....	.....	.....	.....	.....
2.6	.....	17.90	.....	37.64	.....	17.83	34.24	40.11	.....	.....	.....	.....	.....	.....	.....	.....
2.5	.....	17.50	16.06	36.43	.....	17.38	33.11	39.05	.....	.....	.....	.....	.....	.....	.....	82.15
2.4	.....	17.11	15.67	35.22	24.23	16.94	31.97	37.98	.....	.....	.....	.....	.....	.....	.....	81.01
2.3	.....	16.71	15.28	34.01	23.49	16.50	30.83	36.91	.....	.....	.....	.....	.....	.....	.....	79.88
2.2	.....	16.32	14.89	32.80	22.75	16.06	29.69	35.84	.....	.....	.....	30.12	.....	.....	.....	78.74
2.1	12.04	15.92	14.50	31.58	22.01	15.62	28.56	34.77	.....	.....	.....	29.40	.....	.....	.....	77.60
2.0	11.73	15.53	14.11	30.37	21.27	15.17	27.42	33.71	.....	.....	.....	28.68	26.04	.....	.....	76.46
1.9	11.43	15.13	13.77	29.16	20.53	14.73	26.28	32.64	.....	.....	.....	27.96	25.45	20.25	.....	73.32
1.8	11.12	14.74	13.33	27.95	19.80	14.29	25.15	31.57	.....	.....	.....	27.24	24.85	19.84	.....	74.18
1.7	10.82	14.34	12.94	26.74	19.06	13.85	24.01	30.50	.....	.....	.....	26.52	24.26	19.43	.....	73.04
1.6	10.51	13.95	12.55	25.53	18.32	13.41	22.87	29.43	.....	.....	.....	25.80	23.66	19.10	.....	71.91
1.5	10.21	13.55	12.16	24.32	17.58	12.97	21.73	28.36	.....	16.99	.....	25.08	23.07	18.60	.....	70.77
1.4	9.90	13.16	11.77	23.10	16.84	12.52	20.60	27.30	.....	15.85	.....	24.36	22.47	18.19	.....	69.63
1.3	9.60	12.76	11.38	21.89	16.11	12.08	19.46	26.23	.....	15.42	.....	23.64	21.88	17.78	9.98	68.49
1.2	9.29	12.37	10.99	20.68	15.37	11.64	18.32	25.16	4.48	14.98	12.13	22.92	21.28	17.37	9.63	67.35
1.1	8.99	11.97	10.60	19.47	14.63	11.20	17.19	24.09	4.86	14.54	11.76	22.20	20.69	16.95	9.29	66.21
1.0	8.68	11.58	10.21	18.26	13.89	10.76	16.05	23.02	4.75	14.10	11.39	21.48	20.09	16.54	8.94	65.08
+.9	8.38	11.18	9.82	17.05	13.15	10.31	14.91	21.96	4.63	13.66	11.01	20.76	19.50	16.13	8.60	63.94
+.8	8.08	10.79	9.93	15.83	12.41	9.87	13.77	20.89	4.52	13.22	10.64	20.04	18.90	15.72	8.25	62.80
+.7	7.77	10.39	9.04	14.62	11.68	9.43	12.64	19.82	4.40	12.78	10.26	19.32	18.31	15.30	7.91	61.66
+.8	7.46	10.00	8.65	13.41	10.94	8.99	11.50	18.75	4.29	12.34	9.89	18.60	17.71	14.89	7.56	60.52
+.5	7.16	9.60	8.26	12.20	10.20	8.55	10.36	17.68	4.18	11.90	9.51	17.88	17.12	14.48	7.21	59.38
+.4	6.85	9.21	7.87	10.99	9.46	8.10	9.23	16.62	4.06	11.47	9.14	17.19	16.52	14.07	6.87	58.24
+.3	6.55	8.81	7.48	9.78	8.72	7.66	8.09	15.55	3.95	11.03	8.77	16.44	15.93	13.66	6.52	57.11
+.2	6.24	8.42	7.09	8.56	7.98	7.22	6.95	14.48	3.83	10.59	8.39	15.72	15.34	13.24	6.18	55.97
+.1	5.94	8.02	6.70	7.35	7.25	6.78	5.81	13.41	3.72	10.15	8.02	15.00	14.74	12.83	5.83	54.83
Mean 0	5.63	7.63	6.31	6.14	6.51	6.34	4.68	12.34	3.60	9.71	7.64	14.28	14.15	12.42	5.48	53.69
−.1	5.33	7.23	5.92	4.93	5.77	5.89	3.54	11.27	3.49	9.27	7.27	13.56	13.55	12.01	5.14	52.55
−.2	5.02	6.84	5.53	3.72	5.03	5.45	2.40	10.21	3.38	8.83	6.89	12.84	12.96	11.60	4.80	51.41
−.3	4.72	6.44	5.14	2.51	4.29	5.01	1.26	9.14	3.26	8.39	6.52	12.12	12.36	11.18	4.45	50.27
−.4	4.41	6.05	4.75	1.29	3.56	4.57	.13	8.07	3.15	7.95	6.15	11.40	11.77	10.77	4.11	49.14
−.5	4.11	5.65	4.36	.08	2.82	4.13	.....	7.00	3.03	7.51	5.77	10.68	11.17	10.35	3.76	48.00
−.6	3.80	5.26	3.96	.....	2.08	3.68	.....	5.93	2.92	7.08	5.40	9.96	10.58	9.95	3.42	46.86
−.7	3.50	4.86	3.57	.....	1.34	3.24	.....	4.87	2.80	6.64	5.02	9.24	9.98	9.53	3.07	45.72
−.8	3.19	4.47	3.18	.....	.60	2.80	.....	3.80	2.69	6.20	4.65	8.52	9.39	9.12	2.73	44.58
−.9	2.89	4.07	2.79	.....	.....	2.36	.....	2.73	2.57	5.76	4.27	7.80	8.79	8.71	2.38	43.44
1.0	2.58	3.68	2.40	.....	.....	1.92	.....	1.66	2.46	5.32	3.90	7.08	8.20	8.30	2.04	42.31
1.1	2.28	3.28	2.01	.....	.....	1.48	.....	.59	2.35	4.88	3.53	6.36	7.60	7.88	1.69	41.17
1.2	1.97	2.89	1.62	.....	.....	1.03	.....	.....	2.23	4.44	3.15	5.64	7.01	7.47	1.35	40.03
1.3	1.67	2.49	1.23	.....	.....	.59	.....	.....	2.12	4.00	2.78	4.92	6.41	7.06	1.00	38.89
1.4	1.36	2.10	.84	.....	.....	.15	.....	.....	2.00	3.56	2.40	4.20	5.82	6.65	.66	37.75
1.5	1.06	1.70	.45	.....	.....	.....	.....	.....	1.89	3.13	2.03	3.48	5.22	6.24	.31	36.61
1.6	.75	1.31	.06	.....	.....	.....	.....	.....	1.77	2.69	1.65	2.76	4.63	5.82	.....	35.47
1.7	.45	.91	.....	.....	.....	.....	.....	.....	1.66	2.25	1.28	2.04	4.03	5.41	.....	34.34
1.8	.14	.52	.....	.....	.....	.....	.....	.....	1.55	1.81	.91	1.32	3.44	5.00	.....	33.20
1.9	.....	.12	.....	.....	.....	.....	.....	.....	1.43	1.37	.53	.60	2.85	4.59	.....	32.06
2.0	.....	.....	.....	.....	.....	.....	.....	.....	1.32	.93	.16	.12	2.25	4.17	.....	30.92
2.1	.....	.....	.....	.....	.....	.....	.....	.....	1.20	.49	.....	.....	1.65	3.76	.....	29.78
2.2	.....	.....	.....	.....	.....	.....	.....	.....	1.09	.05	.....	.....	1.06	3.35	.....	28.64
2.3	.....	.....	.....	.....	.....	.....	.....	.....	.97	.....	.....	.....	.47	2.94	.....	27.51
2.4	.....	.....	.....	.....	.....	.....	.....	.....	.86	.....	.....	.....	.....	2.53	.....	26.37
2.5	.....	.....	.....	.....	.....	.....	.....	.....	.74	.....	.....	.....	.....	2.11	.....	25.23
2.6	.....	.....	.....	.....	.....	.....	.....	.....	.63	.....	.....	.....	.....	1.70	.....	24.09
2.7	.....	.....	.....	.....	.....	.....	.....	.....	.52	.....	.....	.....	.....	1.29	.....	22.95
2.8	.....	.....	.....	.....	.....	.....	.....	.....	.40	.....	.....	.....	.....	.88	.....	21.81
2.9	.....	.....	.....	.....	.....	.....	.....	.....	.29	.....	.....	.....	.....	.46	.....	20.67
3.0	.....	.....	.....	.....	.....	.....	.....	.....	.17	.....	.....	.....	.....	.05	.....	19.54
3.1	.....	.....	.....	.....	.....	.....	.....	.....	.06	.....	.....	.....	.....	.....	.....	18.40
3.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17.26
3.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	16.12
3.4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	14.98
3.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13.84
3.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12.70

With regard to alpha total scores the tests, in the order of their lengths of range, are, beginning with the longest, 2, 1, 3, 6, 8, 5, 4, and 7. (See table 157.) As we ascend the scale of total scores, additional components will probably be added to typical combinations in this order. On this assumption we need to know the multipliers of d in the regression equations

of each test on the total, for combinations of the first two tests, the first three, the first four, etc. These multipliers are as follows:

Alpha 2.	Alpha 1.	Alpha 3.	Alpha 6.	Alpha 8.	Alpha 5.	Alpha 4	Alpha 7.
0.1453506	0.1396310	.....	.....	.....	.....	...	.....
.0458082	.0864460	0.0912423	.....	.....	.....	..	.....
.0691728	.0621952	.0628179	.0660529	.....	.....	.....	.....
.0385220	.0344517	.0370119	.0364630	0.0409270	.....	.....	.....
.0297084	.0265980	.0287184	.0277077	.0316605	0.0309948	.....	.....
.0219057	.0196799	.0208881	.0194508	.0228309	.0222901	0.0232503	.....
.0173259	.0155645	.0167631	.0159664	.0180446	.0181619	.0185850	0.0172455

We shall assume that a total score value corresponding to the mid-point of each class interval is typical of that interval. Therefore $2\frac{1}{2}$ points will be taken as characteristic of the interval 0–4, $7\frac{1}{2}$ as characteristic of the interval 5–9, etc. Of course actual scores in half-points do not exist, but this fact does not invalidate their theoretical use.

Considering first the class interval 0–4, we can scarcely assume scores in a combination of three tests to be typical, if we take its mid-point, $2\frac{1}{2}$, as representative of all scores falling within it, for points earned in three tests must necessarily total to three or more; but, since we are dealing with fractional points, $2\frac{1}{2}$ might theoretically be composed of more than $\frac{1}{2}$ point in each of three tests. We therefore determine whether this is possible. On the assumption of three components in a total of $2\frac{1}{2}$ points, d in the above formulæ is the difference between $2\frac{1}{2}$ and the sum of the means of the three variables most likely to be involved, viz, tests 1, 2, and 3. The sum of these three means is 19.5688, and consequently

$$d = -17.0688$$

Multiplying this value in turn by the values in the second row of the above table (the first row contains the regression coefficients of 2 and 1, respectively, on the sum of 2 and 1, the second row the regressions of 2, 1, and 3, respectively, on the sum of 2, 1, and 3, etc.), we obtain

$$\frac{\alpha_1}{\sigma_1} = -1.48355$$

$$\frac{\alpha_2}{\sigma_2} = -1.63687$$

$$\frac{\alpha_3}{\sigma_3} = -1.55740$$

But $-1.5570\ \sigma$ for alpha 3 corresponds to 0.2293 points, and since this is less than $\frac{1}{2}$ point, 3 should be rejected from the combination taken as typical of the class interval 0–4. We therefore take tests 1 and 2 as the typical combination, and find the difference between the sum of their means and $2\frac{1}{2}$. The new d is 10.7611, and using the regression coefficients in the first row of the above table we find:

$$\frac{\alpha_1}{\sigma_1} = -1.6283$$

$$\frac{\alpha_2}{\sigma_2} = -1.6949$$

Proceeding in exactly the same manner with the class interval 5–9 we find that, if a combination of 1, 2, 3, 6, and 8 is assumed, a deviation of -1.2585 for test 8 results. This value corresponds to -1.0995 points, so that test 8 must be rejected from the combination taken as typical for this class interval. Using 1, 2, 3, and 6, we find:

$$\frac{\alpha_1}{\sigma_1} = -1.1448 \qquad \frac{\alpha_2}{\sigma_2} = -1.2732 \qquad \frac{\alpha_3}{\sigma_3} = -1.1562 \qquad \frac{\alpha_6}{\sigma_6} = -1.2158$$

all of which lie above the zero points of their respective scales.

Proceeding in this manner for each class interval we obtain a table of deviation values (table 158) for the complete range of alpha total scores:

TABLE 158.—*Deviation values for every class-interval of the alpha scale and every alpha test.* (*See text.*)

Class interval.	Alpha test.							
	1	2	3	4	5	6	7	8
0- 4	−1.6283	−1.6949	.....	.....	.....	.....	.....	.....
5- 9	−1.1448	−1.2732	−1.1562	.....	.....	−1.2158	.....	.....
10- 14	− .8871	− .9919	− .9530	.....	.....	− .9389	.....	−1.0538
15- 19	− .7148	− .7993	− .7680	.....	.....	− .7566	.....	− .8492
20- 24	− .5920	− .6613	− .6392	.....	− .6899	− .6167	.....	− .7048
25- 29	− .4591	− .5127	− .4957	.....	− .4359	− .4782	.....	− .5464
30- 34	− .3511	− .3920	− .3843	− .4278	− .4101	− .3581	.....	− .4201
35- 39	− .3132	− .3479	− .3366	− .3731	− .3647	− .3206	− .3463	− .3623
40- 44	− .2347	− .2612	− .2528	− .2802	− .2739	− .2407	− .2600	− .2721
45- 49	− .1569	− .1746	− .1689	− .1873	− .1830	− .1609	− .1738	− .1819
50- 54	− .0790	− .0880	− .0851	− .0944	− .0922	− .0811	− .0876	− .0916
55- 59	− .0012	− .0014	− .0013	− .0015	− .0014	− .0013	− .0014	− .0014
60- 64	.0766	.0853	.0825	.0915	.0894	.0786	.0849	.0888
65- 69	.1544	.1719	.1663	.1844	.1802	.1584	.1647	.1790
70- 74	.2322	.2585	.2501	.2773	.2710	.2382	.2445	.2693
75- 79	.3101	.3452	.3339	.3702	.3618	.3181	.3244	.3595
80- 84	.3879	.4318	.4178	.4631	.4526	.3979	.4042	.4497
85- 89	.4657	.5184	.5016	.5560	.5434	.4777	.4840	.5399
90- 94	.5435	.6050	.5854	.6489	.6342	.5576	.5639	.6301
95- 99	.6214	.6917	.6692	.7419	.7251	.6374	.6437	.7204
100-104	.6992	.7783	.7530	.8348	.8159	.7172	.7235	.8106
105-109	.7770	.8649	.8368	.9277	.9067	.7971	.8034	.9008
110-114	.8548	.9516	.9207	1.0206	.9975	.8769	.8832	.9910
115-119	.9327	1.0382	1.0045	1.1135	1.0883	.9567	.9630	1.0813
120-124	1.0105	1.1248	1.0883	1.2064	1.1791	1.0366	1.0429	1.1715
125-129	1.0883	1.2115	1.1721	1.2994	1.2699	1.1164	1.1227	1.2617
130-134	1.1661	1.2981	1.2559	1.3923	1.3607	1.1962	1.2025	1.3519
135-139	1.2439	1.3847	1.3397	1.4852	1.4515	1.2761	1.2824	1.4422
140-144	1.3218	1.4713	1.4236	1.5781	1.5423	1.1356	1.3622	1.5324
145-149	1.3996	1.5587	1.5074	1.6710	1.6331	1.4357	1.4420	1.6226
150-154	1.4774	1.6446	1.5912	1.7639	1.7240	1.5156	1.5219	1 7128
155-159	1.5552	1.7312	1.6750	1.8568	1.8148	1.5954	1.6017	1.8030
160-164	1.6331	1.8179	1.7588	1.9498	1.9056	1.6752	1.6815	1.8933
165-169	1.7109	1.9045	1.8426	2.0427	1.9964	1.7551	1.7613	1.9835
170-174	1.7887	1.9911	1.9264	2.1356	2.0872	1.8349	1.8412	2.0737
175-179	1.8665	2.0778	2.0103	2.2285	2.1780	1.9147	1.9210	2.1639
180-184	1.9443	2.1644	2.0941	2.3214	2.2688	1.9945	2.0008	2.2542
185-189	2.0222	2.2510	2.1779	2.4143	2.3596	2.0744	2.0807	2.3444
190-194	2.1000	2.3376	2.2617	2.5072	2.4504	2.1542	2.1605	2.4346

With the aid of this table we treat each class interval exactly as we should have treated individual cases if that procedure had been possible. Thus the lowest class interval, 0–4, is treated as an individual case with scores of 0.6685 and 0.9315 in tests 1 and 2, respectively, and zero scores in all other tests, and the probable score on the combination scale is calculated by means of a multiple regression equation connecting these three variables. Similar procedure is followed for the remaining class intervals. We thus require six different equations to fit the six different typical combinations of variables—the variables shown in table 158. If we designate by C a combination scale score, the regression equations will be of the form

$$C - m_c = -\Sigma_c \left\{ \frac{R_{c1}}{R_{cc}} \cdot \frac{\alpha_1}{\sigma_1} + \frac{R_{c2}}{R_{cc}} \cdot \frac{\alpha_2}{\sigma_2} + \frac{R_{c3}}{R_{cc}} \cdot \frac{\alpha_3}{\sigma_3} + \quad . \quad . \quad . \quad + \frac{R_{c8}}{R_{cc}} \frac{\alpha_8}{\sigma_8} \right\}$$

where R_{cc}, R_{c1}, R_{c2}, R_{c3}, etc., are the minors corresponding to the elements in the first row and first column, first row and second column, first row and third column, etc., respectively, taken with the signs corresponding to these elements, in the determinant:

$$R_{00} = \begin{vmatrix} 1 & r_{1c} & r_{2c} & r_{3c} & . & . & . & r_{8c} \\ r_{c1} & 1 & r_{21} & r_{31} & . & . & . & r_{81} \\ r_{c2} & r_{12} & 1 & r_{32} & . & . & . & r_{82} \\ & & & & . & . & . & \\ & & & & . & . & . & \\ & & & & . & . & . & \\ r_{c8} & r_{18} & r_{28} & & . & . & . & 1 \end{vmatrix}$$

Now r_{1c}, r_{2c}, r_{3c}, r_{4c}, etc., are the correlations of tests 1, 2, 3, 4, . . . respectively, with combination scores, or, in other words, according to the definition of the combined scale with

the sum of all alpha and beta scores, plus mental age rating. Since this sum is an unweighted one, we can calculate these correlations from the correlation coefficients of table 155 and the appropriate standard deviations of table 156. Thus, for the equation including all eight alpha variables the basic determinant is:

$$R_{00}=\begin{vmatrix} 1 & 0.7956 & 0.8795 & 0.8317 & 0.9041 & 0.8792 & 0.8163 & 0.8401 & 0.8764 \\ .7965 & 1 & .7304 & .5897 & .7093 & .6892 & .6802 & .6697 & .6584 \\ .8795 & .7304 & 1 & .7455 & .7915 & .7634 & .7730 & .7357 & .7425 \\ .8317 & .5897 & .7455 & 1 & .8055 & .7543 & .6129 & .6714 & .7750 \\ .9041 & .7093 & .7915 & .8055 & 1 & .8343 & .6814 & .7304 & .8608 \\ .8792 & .6862 & .7634 & .7543 & .8343 & 1 & .6736 & .7784 & .8227 \\ .8163 & .6802 & .7730 & .6129 & .6814 & .6736 & 1 & .7036 & .6930 \\ .8401 & .6697 & .7357 & .6714 & .7304 & .7784 & .7036 & 1 & .6718 \\ .8764 & .6584 & .7425 & .7750 & .8608 & .8227 & .6930 & .6718 & 1 \end{vmatrix}$$

The basic determinants for the shorter equations will of course be portions of the above determinant, i. e., what is left after the rows and columns corresponding to omitted variables are struck out.

We thus obtain the following equations:

$$C=M_c+\Sigma_c\left\{.3284\left(\frac{\alpha_1}{\sigma_1}\right)+.6396\left(\frac{\alpha_2}{\sigma_2}\right)\right\} \tag{7}$$

$$=M_c+\Sigma_c\left\{.2349\left(\frac{\alpha_1}{\sigma_1}\right)+.2599\left(\frac{\alpha_2}{\sigma_2}\right)+.3525\left(\frac{\alpha_3}{\sigma_3}\right)+.2396\left(\frac{\alpha_6}{\sigma_6}\right)\right\} \tag{8}$$

$$=M_c+\Sigma_c\left\{.2106\left(\frac{\alpha_1}{\sigma_1}\right)+.2333\left(\frac{\alpha_2}{\sigma_2}\right)+.1683\left(\frac{\alpha_3}{\sigma_3}\right)+.1776\left(\frac{\alpha_6}{\sigma_6}\right)+.2954\left(\frac{\alpha_8}{\sigma_8}\right)\right\} \tag{9}$$

$$=M_c+\Sigma_c\left\{.1599\left(\frac{\alpha_1}{\sigma_1}\right)+.1852\left(\frac{\alpha_2}{\sigma_2}\right)+.1770\left(\frac{\alpha_3}{\sigma_3}\right)+.2112\left(\frac{\alpha_5}{\sigma_5}\right)+.1737\left(\frac{\alpha_6}{\sigma_6}\right)+.2026\left(\frac{\alpha_8}{\sigma_8}\right)\right\} \tag{10}$$

$$=M_c+\Sigma_c\left\{.1358\left(\frac{\alpha_1}{\sigma_1}\right)+.1390\left(\frac{\alpha_2}{\sigma_2}\right)+.1362\left(\frac{\alpha_3}{\sigma_3}\right)+.1959\left(\frac{\alpha_4}{\sigma_4}\right)+.1844\left(\frac{\alpha_5}{\sigma_5}\right)+.1797\left(\frac{\alpha_6}{\sigma_6}\right)+.1307\left(\frac{\alpha_8}{\sigma_8}\right)\right\} \tag{11}$$

$$C=M_c+\Sigma_c\left\{.1183\left(\frac{\alpha_1}{\sigma_1}\right)+.1392\left(\frac{\alpha_2}{\sigma_2}\right)+.1201\left(\frac{\alpha_3}{\sigma_3}\right)+.1755\left(\frac{\alpha_4}{\sigma_4}\right)+.0979\left(\frac{\alpha_5}{\sigma_5}\right)+.1402\left(\frac{\alpha_6}{\sigma_6}\right)+.1663\left(\frac{\alpha_7}{\sigma_7}\right)+.1616\left(\frac{\alpha_8}{\sigma_8}\right)\right\} \tag{12}$$

Having located the center of each subgroup of the total score distribution on our combination, we need to consider the variability of these subgroups. It is evident that they are not equally variable, for combination scores can be predicted from scores in two tests less precisely than from scores in eight tests. For, by means of the formula

$$R=\sqrt{1-\frac{R_{00}}{R_{cc}}},$$

the maximum correlation between combination scores predicted from the various sets of variables by the above equations and actual combination scores can be calculated. We find

Equation (7) $R=0.9076$
Equation (8) $R=.9473$
Equation (9) $R=.9574$
Equation (10) $R=.9707$
Equation (11) $R=.9721$
Equation (12) $R=.9770$

Otherwise stated the variabilities of the groups in the alpha total score class intervals as measured by a combination scale are given by

$$S_c = \Sigma_c \sqrt{\frac{R_{00}}{R_{cc}}},$$

so that for the class intervals in order we get:

Class interval	Variability $= S_c$.
0– 4	36.91
5– 9	26.00
10–14	23.42
15–19	23.42
20–24	19.40
25–29	19.40
30–34	19.03
35–39	16.08
40–44	16.08
45–49	16.08
etc.	etc.

The variability for all class intervals above 35 points total score is constant.

We next assume that these groups will be symmetrically distributed about their means, and by means of Sheppard's tables distribute them according to the above set of standard deviations. Table 159 is the final product of this procedure.

TABLE 159.—*Showing how the frequencies of each class interval of an alpha distribution should be disposed on the combined scale.*

Alpha scale.	Combined scale.																									
	0.0–0.9	1.0–1.9	2.0–2.9	3.0–3.9	4.0–4.9	5.0–5.9	6.0–6.9	7.0–7.9	8.0–8.9	9.0–9.9	10.0–10.9	11.0–11.9	12.0–12.9	13.0–13.9	14.0–14.9	15.0–15.9	16.0–16.9	17.0–17.9	18.0–18.9	19.0–19.9	20.0–20.9	21.0–21.9	22.0–22.9	23.0–23.9	24.0–24.9	25.0–25.9
205–209																						3.8	35.6	49.7	10.6	0.3
200–204																					0.2	8.6	47.1	39.2	4.8	0.1
195–199																					0.9	18.3	54.3	24.8	1.6	
190–194																					2.9	31.9	51.8	12.9	0.4	
185–189																				0.2	8.6	47.1	39.2	4.8		
180–184																				0.6	15.5	53.4	28.3	2.2		
175–179																				2.2	28.3	53.4	15.5	0.6		
170–174																				6.1	42.6	44.1	7.1			
165–169																			0.5	14.1	52.7	30.1	2.5			
160–164																			0.9	18.3	54.3	24.8	1.6			
155–159																			4.8	39.2	47.1	8.6	0.2			
150–154																		0.4	11.6	50.9	33.8	3.3				
145–149																		1.2	21.5	54.7	21.5	1.2				
140–144																		3.8	35.6	49.7	10.6	0.3				
135–139																	0.3	9.6	48.5	37.4	4.3					
130–134																	1.0	19.9	54.6	23.1	1.4					
125–129																	3.3	33.8	50.9	11.6	0.4					
120–124																0.2	7.8	45.7	40.9	5.5						
115–119																0.7	16.9	53.9	26.6	1.9						
110–114																2.5	30.1	52.7	14.2	0.5						
105–109																7.1	44.1	42.6	6.2							
100–104															0.5	14.2	52.7	30.1	2.5							
95– 99															1.9	26.5	53.9	16.9	0.8							
90– 94															5.5	40.9	45.7	7.7	0.2							
85– 89														0.4	11.6	50.9	33.8	3.3								
80– 84														1.4	23.1	54.6	19.9	1.0								
75– 79														4.3	37.4	48.5	9.6	0.3								
70– 74													0.3	10.6	49.7	35.6	3.8									
65– 69													1.0	19.9	54.6	23.1	1.4									
60– 64													3.3	33.8	50.9	11.6	0.4									
55– 59												0.2	8.6	47.1	39.2	4.8										
50– 54												0.8	18.3	54.3	24.8	1.6										
45– 49												2.9	31.9	51.8	12.9	0.4										
40– 44											0.2	7.7	45.7	40.9	5.5											
35– 39											0.6	15.5	53.4	28.3	2.2											
30– 34											2.5	23.0	49.0	23.0	2.5											
25– 29										0.4	8.0	37.6	42.1	11.2	0.7											
20– 24										2.4	21.8	47.7	25.0	3.0												
15– 19										11.1	32.9	36.7	16.6	2.6												
10– 14								0.2	2.8	17.6	38.0	31.7	8.7	0.8												
5– 9							0.5	4.7	20.2	36.3	37.8	9.1	1.2	0.2												
0– 4					0.7	3.1	9.6	20.0	26.1	22.6	12.3	5.2	0.4													

In the case of the beta total scores we meet with difficulty owing to the lack of resemblance of the score distributions of tests 1, 2, and 3 to the normal type. To analyze scores corresponding to the mid-points of class intervals by methods deduced from the equations of a normal system of variates would do too much violence to the facts to give a result of practical

value. We have therefore to adopt the following method of treatment. Tests 4, 5, 6, and 7 we may consider as properly treated as a normal system in the same manner as the alpha tests.

TABLE 160.—*Variables: Beta total score × sum of scores in beta tests 4, 5, 6, 7. Group X: Special experimental group.*

Beta 4, 5, 6, 7.	Beta total.																							
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	f
20																									
19																									
18																									
17																									
16																						1	6	2	9
15																					3	6	1		10
14																	1	1	1	12	23	2			40
13																1	1	5	25	29	4				65
12														1		5	16	35	29	1					87
11														4	7	23	48	35	1						118
10												2	7	11	37	41	27	2	1						128
9											7	8	25	38	27	9									112
8									1		11	20	29	14	5										80
7								1	7	13	19	25	14	4											83
6								7	14	19	16	6													62
5						2	10	23	25	7	6	1													74
4					4	18	7	19	4	2															54
3				3	18	17	10	3																	51
2			5	10	12	3																			30
1		5	12	9	2																				28
0	8	5	3																						16
f	8	10	20	22	36	40	27	53	51	41	59	62	75	70	76	79	93	78	57	42	30	9	7	2	

A correlation has been formed for total beta score and for the sum of scores in tests 4, 5, 6, and 7. (Table 160.) We find the correlation between these two sums to be 0.9795, and the regression of beta (4, 5, 6, 7) on beta (total) is given by:

$$\beta_{(4567)} = 0.7055\beta_T - 0.3653$$

By means of this equation we calculate sums of scores in beta (4, 5, 6, 7) for beta total scores of $2\frac{1}{2}$, $7\frac{1}{2}$, $12\frac{1}{2}$, etc., and proceed to analyze these into their typical components, as in the case of alpha. Table 161 of typical deviation complexes results.

We require four different regression equations, the longest of which has for its basic determinant:

$$R_{00} = \begin{vmatrix} 1 & 0.8227 & 0.7446 & 0.7067 & 0.6930 \\ .8127 & 1 & .7520 & .6438 & .5634 \\ .7446 & .7520 & 1 & .5629 & .5523 \\ .7067 & .6438 & .5629 & 1 & .5694 \\ .6930 & .5634 & .5523 & .5694 & 1 \end{vmatrix}$$

TABLE 161.—*Deviation values for every class-interval on the beta scale for tests 4, 5, 6, and 7, and these tests together. (See text.)*

Class-interval—Beta total.	Beta (4, 5, 6, 7).	Beta test.			
		4	5	6	7
0– 4	1.3985			−2.6736	
5– 9	4.9260		−2.2374	−2.0215	
10– 14	8.4536		−1.8727	−1.6920	
15– 19	11.9811	−1.7638	−1.6845	−1.4903	
20– 24	15.5087	−1.5482	−1.4786	−1.3082	
25– 29	19.0362	−1.4179	−1.3584	−1.2262	−1.1451
30– 34	22.5638	−1.2316	−1.1828	−1.0677	−.9971
35– 39	26.0913	−1.0514	−1.0073	−.9093	−.8491
40– 44	29.6189	−.8682	−.8317	−.7508	−.7012
45– 49	33.1464	−.6849	−.6562	−.5924	−.5532
50– 54	36.6740	−.5017	−.4807	−.4339	−.4052
55– 59	40.2015	−.3185	−.3051	−.2754	−.2572
60– 64	43.7291	−.1353	−.1296	−.1170	−.1093
65– 69	47.2566	−.0480	−.0460	−.0414	−.0387
70– 74	50.7842	.2312	.2215	.1999	.1867
75– 79	54.3117	.4144	.3971	.3583	.3346
80– 84	57.8393	.5976	.5726	.5168	.4826
85– 89	61.3668	.7809	.7482	.6753	.6308
90– 94	64.8944	.9641	.9236	.8337	.7786
95– 99	68.4219	1.1473	1.0992	.9921	.9265
100–104	71.9475	1.3201	1.2608	1.1155	
105–109	75.4770	1.5558	1.4667	1.2977	
110–114	79.0046	1.7514	1.6726	1.4798	
115–119	82.5321	1.9670	1.8785	1.6670	

The equations as determined from these correlation coefficients are:

$$C = M_C + \Sigma_c 0.70674\left(\frac{\beta_6}{\sigma_6}\right) \tag{13}$$

$$= M_C + \Sigma_c\left\{0.5076\left(\frac{\beta_5}{\sigma_5}\right) + 0.4210\left(\frac{\beta_6}{\sigma_6}\right)\right\} \tag{14}$$

$$= M_C + \Sigma_c\left\{0.4403\left(\frac{\beta_4}{\sigma_4}\right) + 0.2565\left(\frac{\beta_5}{\sigma_5}\right) + 0.2789\left(\frac{\beta_6}{\sigma_6}\right)\right\} \tag{15}$$

$$= M_C + \Sigma_c\left\{0.3963\left(\frac{\beta_4}{\sigma_4}\right) + 0.1978\left(\frac{\beta_5}{\sigma_5}\right) + 0.1997\left(\frac{\beta_6}{\sigma_6}\right) + 0.2468\left(\frac{\beta_7}{\sigma_7}\right)\right\} \tag{16}$$

and the total correlations and standard deviations of class interval subgroups are:

Equation (13)	$R = 0.7067$	Standard deviation 57.33
(14)	.8219	46.21
(15)	.8636	40.89
(16)	.8841	37.91

In the same manner as the class-interval subgroups of the distribution of alpha total scores were redistributed upon the combination scale, we redistribute the class-interval subgroups for the beta total score by means of table 162, which is calculated from the equations and standard deviations given above.

TABLE 162.—*Showing how the frequencies of each class interval of a beta distribution should be disposed on the combined scale.*

Beta scale.	Combined scale.																										
	0.0–0.9	1.0–1.9	2.0–2.9	3.0–3.9	4.0–4.9	5.0–5.9	6.0–6.9	7.0–7.9	8.0–8.9	9.0–9.9	10.0–10.9	11.0–11.9	12.0–12.9	13.0–13.9	14.0–14.9	15.0–15.9	16.0–16.9	17.0–17.9	18.0–18.9	19.0–19.9	20.0–20.9	21.0–21.9	22.0–22.9	23.0–23.9	24.0–24.9	25.0–25.9
115–118	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.2	0.9	3.4	9.3	17.8	23.6	22.2	14.0	6.2	1.9	0.5	...
110–114	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.5	2.2	6.8	15.0	22.3	23.4	17.1	8.7	3.1	1.0	...	...
105–109	...	...	...	...	...	...	...	...	...	...	...	...	...	0.3	1.4	4.8	11.7	20.1	24.0	19.9	11.6	4.7	1.3	0.3	...	...
100–104	...	...	...	...	...	...	...	...	...	...	...	...	0.2	0.4	3.2	8.8	17.2	23.4	22.5	14.5	6.7	2.1	0.6	...	...	...
95– 99	...	...	...	...	...	...	...	...	...	...	...	...	0.2	0.9	4.0	11.4	21.2	25.9	20.7	10.9	3.8	1.0	...	...	...	...
90– 94	...	...	...	...	...	...	...	...	...	...	...	...	0.5	2.3	7.8	17.2	25.0	23.9	15.0	6.2	1.7	0.3	...	...	...	...
85– 89	...	...	...	...	...	...	...	...	...	...	...	0.2	1.2	4.8	12.8	22.4	25.7	19.4	9.6	3.1	0.8	...	...	...	...	...
80– 84	...	...	...	...	...	...	...	...	...	...	...	0.6	2.8	8.9	18.6	25.5	23.0	13.7	5.3	1.4	0.3	...	...	...	...	...
75– 79	...	...	...	...	...	...	...	...	...	...	0.3	1.5	5.7	14.0	23.4	25.4	18.1	8.5	2.6	0.6	...	...	...	...	...	...
70– 74	...	...	...	...	...	...	...	...	...	...	0.8	3.3	10.0	20.0	25.8	22.0	12.3	4.5	1.1	0.1	...	...	...	...	...	...
65– 69	...	...	...	...	...	...	...	...	...	0.4	1.8	6.6	15.7	26.7	22.4	16.4	7.4	2.2	0.5	...	...	...	...	...	...	...
60– 64	...	...	...	...	...	...	...	...	0.2	0.9	4.0	11.3	21.1	25.9	20.8	11.0	3.8	1.0	...	...	...	...	...	...	...	...
55– 59	...	...	...	...	...	...	...	...	0.5	2.2	7.6	14.0	28.0	24.0	15.2	6.3	1.7	0.4	...	...	...	...	...	...	...	...
50– 54	...	...	...	...	...	...	...	0.2	1.1	4.7	12.6	22.2	25.7	19.6	9.8	3.2	0.8	...	...	...	...	...	...	...	...	...
45– 49	...	...	...	...	...	...	...	0.6	2.7	8.7	18.4	25.5	23.1	13.8	5.4	1.4	0.3	...	...	...	...	...	...	...	...	...
40– 44	...	...	...	...	...	...	0.3	1.5	5.6	14.1	23.0	25.4	18.3	8.6	2.7	0.6	...	...	...	...	...	...	...	...	...	...
35– 39	...	...	...	...	...	...	0.8	3.3	9.9	19.7	25.8	22.1	12.5	4.6	1.1	0.2	...	...	...	...	...	...	...	...	...	...
30– 34	...	...	...	...	...	0.4	1.8	6.5	15.5	27.4	21.7	16.7	7.3	2.2	0.5	...	...	...	...	...	...	...	...	...	...	...
25– 29	...	...	...	...	0.2	0.9	3.9	11.2	21.0	25.9	21.0	11.2	3.9	0.9	0.2	...	...	...	...	...	...	...	...	...	...	...
20– 24	...	...	...	...	0.5	1.8	5.9	13.5	21.5	23.8	18.3	9.9	3.6	1.0	0.2	...	...	...	...	...	...	...	...	...	...	...
15– 19	...	...	...	0.2	1.1	4.0	10.5	19.0	23.9	21.2	12.7	5.4	1.6	0.4	...	...	...	...	...	...	...	...	...	...	...	...
10– 14	...	...	0.1	0.6	2.1	5.8	11.9	18.7	21.3	18.5	12.0	5.9	2.2	0.6	0.2	...	...	...	...	...	...	...	...	...	...	...
5– 9	...	...	0.8	2.3	6.1	12.3	18.7	21.3	18.5	11.7	5.6	2.0	0.6	0.1	...	...	...	...	...	...	...	...	...	...	...	...
0– 4	...	0.6	1.3	3.2	6.3	10.8	14.6	17.3	16.6	12.9	8.7	4.6	2.2	0.8	0.3	...	...	...	...	...	...	...	...	...	...	...

It will be noted that in table 161 beta 7 is omitted from the combination of variables, which is taken as typical of the highest four class intervals. This omission is because of the limitation of the upper end of the beta 7 scale, which we may consider acute enough to render scores of 9 and 10 differentially of little significance and of the same character as zero scores in so far as they are, owing to inadequacies of the test, substitutes for scores of 11, 12, 13, etc.

Finally, we find the correlation of Stanford-Binet mental age with combination scale scores to be 0.8871, which enables us to write the following regression equation, giving probable combination scores for given mental age:

$$C = 1.01 \text{ M. A.} + 0.33$$

Since we adopted the policy of distributing the class-interval subgroups of alpha and beta total score distributions, where variability was not constant throughout the range, we may follow

the same procedure with class-interval frequencies for mental age, although the variability of these groups is practically constant so far as can be determined from our data. Such a procedure simplifies the addition of frequencies coming from the three original, different distributions at the same level of the combined scale. The result of this treatment of the mental age variable is table 163, in which the standard deviation of the mental age arrays is 37.45 in points of combined scale.

TABLE 163.—*Showing how the frequencies of each class interval of a Stanford-Binet mental age distribution should be disposed on the combined scale.*

(This table is made from the regression of combined scale on mental age, which is : Combined scale=1.01 M. A. (in years)+0.33. Standard deviation of combined scale arrays of any type (mental age) is 1.498 class intervals.)

Stanford-Binet mental age.	Combined scale.																										
	1.0–1.9	2.0–2.9	3.0–3.9	4.0–4.9	5.0–5.9	6.0–6.9	7.0–7.9	8.0–8.9	9.0–9.9	10.0–10.9	11.0–11.9	12.0–12.9	13.0–13.9	14.0–14.9	15.0–15.9	16.0–16.9	17.0–17.9	18.0–18.9	19.0–19.9	20.0–20.9	21.0–21.9	22.0–22.9	23.0–23.9	24.0–24.9	25.0–25.9
20																0.5	2.5	8.3	18.1	25.3	23.4	14.5	5.5	1.7	
19.5–19.9																1.4	4.8	13.0	22.9	26.0	19.0	9.3	2.9	0.7	
19.0–19.4															0.5	2.5	8.3	18.1	25.3	23.4	14.5	5.5	1.7		
18.5–18.9															1.4	4.8	13.0	22.9	26.0	19.0	9.3	2.9	0.7		
18.0–18.4														0.5	2.5	8.3	18.1	25.3	23.4	14.5	5.5	1.7			
17.5–17.9														1.4	4.8	13.0	22.9	26.0	19.0	9.3	2.9	0.7			
17.0–17.4													0.6	2.6	8.6	18.4	25.7	23.1	13.9	5.4	1.6				
16.5–16.9													1.5	5.0	13.3	23.2	25.5	18.9	8.9	2.7	0.6				
16.0–16.4												0.6	2.6	8.6	18.4	25.7	23.1	13.9	5.4	1.6					
15.5–15.9												1.5	5.0	13.3	23.2	25.5	18.9	8.9	2.7	0.6					
15.0–15.4											0.6	2.6	8.6	18.4	25.7	23.1	13.9	5.4	1.6						
14.5–14.9											1.5	5.0	13.5	23.2	25.5	18.9	8.9	2.7	0.6						
14.0–14.4										0.6	2.7	8.9	18.9	25.5	23.2	13.5	5.0	1.5							
13.5–13.9										1.5	5.0	13.5	23.2	25.5	18.9	8.9	2.7	0.6							
13.0–13.4									0.6	2.7	8.9	18.9	25.5	23.2	13.5	5.0	1.5								
12.5–12.9									1.6	5.4	13.9	23.1	25.7	18.4	8.6	2.6	0.6								
12.0–12.4								0.6	2.7	8.9	18.9	25.5	23.2	13.5	5.0	1.5									
11.5–11.9								1.6	5.4	13.9	23.1	25.7	18.4	8.6	2.6	0.6									
11.0–11.4							0.6	2.7	8.9	18.9	25.5	23.2	13.5	5.0	1.5										
10.5–10.9							1.6	5.4	13.9	23.1	25.7	18.4	8.6	2.6	0.6										
10.0–10.4						0.7	2.9	9.3	19.0	26.0	22.9	13.0	4.8	1.4											
9.5–9.9					1.6	5.4	13.9	23.1	25.7	18.4	8.6	2.6	0.6												
9.0–9.4				0.7	2.9	9.3	19.0	26.0	22.9	13.0	4.8	1.4													
8.5–8.9				1.7	5.5	14.5	23.4	25.3	18.1	8.3	2.5	0.5													
8.0–8.4			0.7	2.9	9.3	19.0	26.0	22.9	13.0	4.8	1.4														
7.5–7.9			1.7	5.5	14.5	23.4	25.3	18.1	8.3	2.5	0.5														
7.0–7.4		0.7	3.1	9.5	19.6	26.1	22.2	12.7	4.6	1.3															
6.5–6.9		1.7	5.5	14.5	23.4	25.3	18.1	8.3	2.5	0.5															
6.0–6.4	0.7	3.1	9.5	19.6	26.1	22.2	12.7	4.6	1.3																
5.5–5.9	1.8	5.9	14.6	24.0	25.1	17.7	7.9	2.3	0.5																
5.0–5.4	3.1	9.5	19.6	26.1	22.2	12.7	4.6	1.3																	
4.5–4.9	5.9	14.6	24.0	25.1	17.7	7.9	2.3	0.5																	

Our plan of combining all types of examination used in the experimental sample, Group X, is thus complete, and we are in position to determine empirically its reliability by testing its fit to the sample upon which it is based. Tables 159 and 162 have been tested for the transformation of alpha and beta totals scores, respectively, for four different divisions of the sample into alpha and beta groups. Thus we have treated the whole sample (1) as having been measured by alpha only, using table 159 only; (2) taking all cases scoring less than 25 points in alpha as beta cases, remainder as alpha cases; (3) all cases below 50 alpha taken as beta cases, remainder as alpha; and (4) all cases below 75 alpha taken as beta cases, remainder as alpha. Histograms of the resulting distributions are given in fig. 6. Mean, standard deviation, and β_1 and β_2 have been calculated for each of the four frequency distributions obtained in this way. These constants are:

	Type of subdivision of Group X.			
	(1)	(2)	(3)	(4)
Mean	13.82716	13.88606	13.94350	13.96981
σ	3.03940	3.03776	3.20690	3.30997
μ_3	2.19357	−3.20281	−8.84043	−8.32654
μ_4	225.63642	266.44592	304.62163	321.35075
β_1	.06103	.01305	.07185	.05266
β_2	2.64376	3.12892	2.88007	2.72294

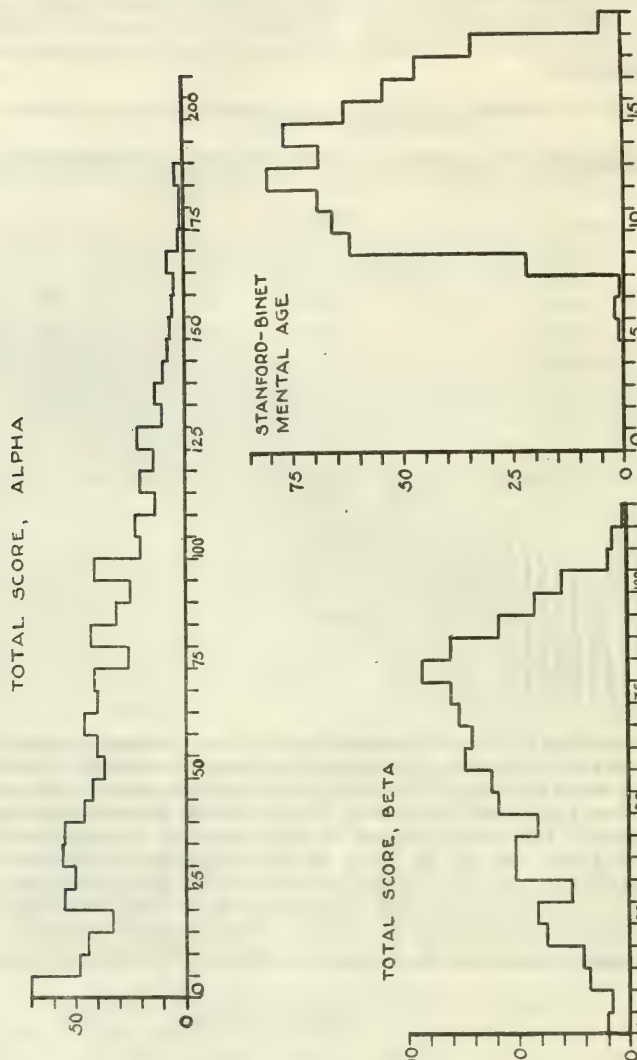

FIG. 5. Histograms of alpha total score, beta total score, and Stanford-Binet mental age. Special experimental group, N, 1,047 cases in alpha and beta histograms, 653 in mental age histogram. Horizontal scale, total score (for alpha and beta), mental age in years (for mental age); vertical scale number of cases.

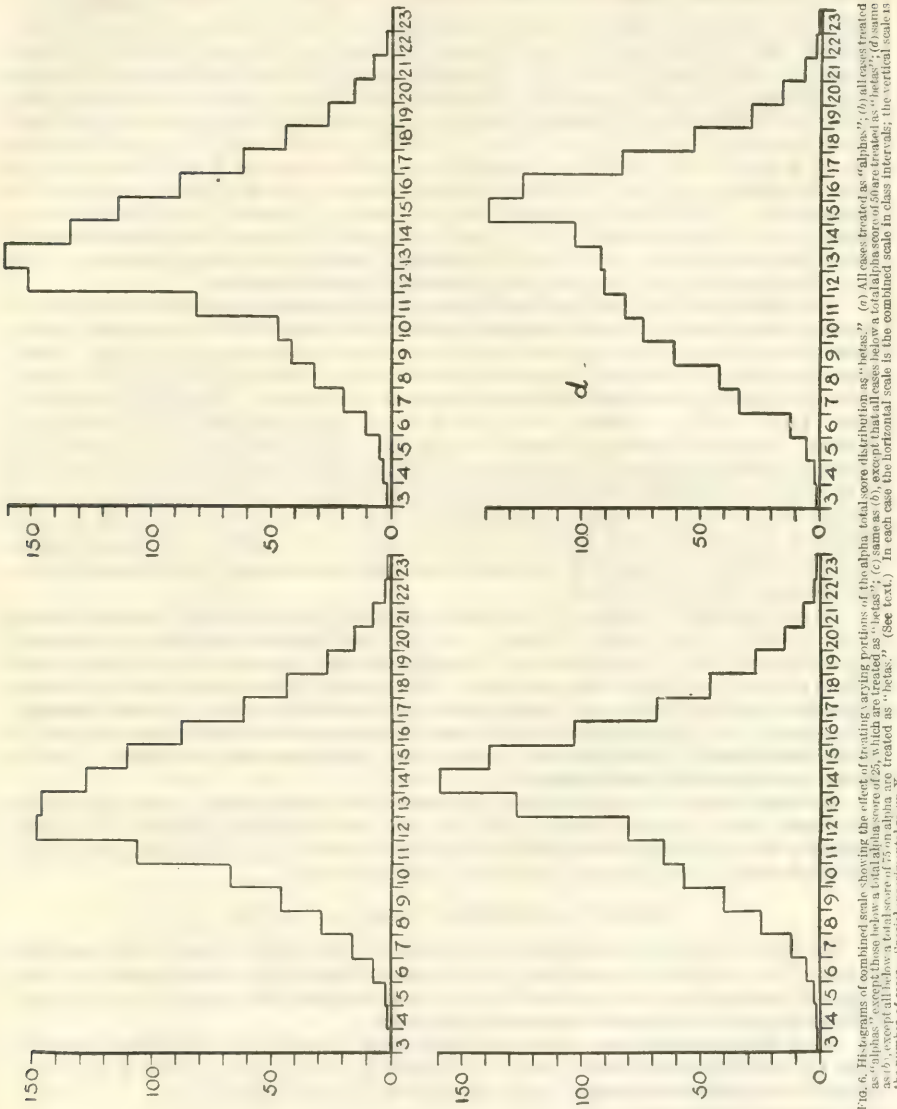

FIG. 6. Histograms of combined scale showing the effect of treating varying portions of the alpha total score distribution as "betas." (*a*) All cases treated as "alphas"; (*b*) all cases treated as "alphas" except those below a total alpha score of 25, which are treated as "betas"; (*c*) same as (*b*), except that all cases below a total alpha score of 50 are treated as "betas"; (*d*) same as (*b*), except all below a total score of 75 on alpha are treated as "betas." (See text.) In each case the horizontal scale is the combined scale in class intervals; the vertical scale is the number of cases. Special experimental group X.

The above constants are in terms of class intervals. A class interval is taken as 25 points of the combined scale. When it is considered that the range of the combined scale is approximately 600 points, and that our experimental sample is actually distributed over 20 of these 25-point class intervals, it will be apparent at once that the means and standard deviations given above, especially the former, differ only negligibly, and that means and standard deviations of subgroups of the principal sample are probably reliable to a degree commensurate with interpretable differences. What significance is to be attached to the values of the third and fourth moments and to the β's is not clear. We believe, however, that the approximate symetry of all four of the distributions warrants the conclusion that one of the objects aimed at from the beginning, viz, the distribution of intelligence upon a linear or nearly linear scale has been reached. If this has been attained, then the means and standard deviations of the subgroups of the principal sample which it may be desirable to compare are in less danger of misinterpretation than they would be if the combined distribution had been based upon a scale much foreshortened at the lower end as is the scale of alpha total scores.

The theoretical mean combined scale score of our experimental sample as obtained by summing means for all alpha and beta tests and mental age (treated as so many points, on the basis of one point per quarter year) is 172.56, or, in terms of class intervals of 25 points, 13.901. Since our combined scale is only an hypothetical one, we may as well drop the use of the original points and adopt any convenient class interval as the unit of the scale. Thus, calling the interval from -150 to -126, 1, -125 to -101, 2, etc., we have a scale of, theoretically, 24 subdivisions or units. In terms of these class intervals or units the standard deviation of our experimental sample is theoretically 3.245, as calculated from the standard deviations and intercorrelations of all component variables. The close agreement between these expected values and the ones actually obtained from the various combinations of alpha and beta total score distributions of the sample that we have tried appears to be justification of the validity of our transformation tables in addition to that given by the approximate agreement among the constants from the four different trials of the method.

An apology should be offered for the absence of probable errors and other constants relating to the reliability of our results. Failure to provide these important auxiliaries of statistical analysis has been due to a combination of circumstances, most important of which was the lack of both time and methods for their calculation. The pressure of time has required the focusing of attention upon the fundamental steps necessary to reach the goal, and it has been necessary to be content with the assumption that the size of the experimental sample was sufficient to justify results from a "common-sense" point of view, notwithstanding the failure to provide precise determinations of their validity.

No claim is made for completeness in treatment of the problem stated at the beginning of this chapter, but it appears that in a rough way the more important difficulties of analysis peculiar to the statistics of psychological data have been overcome, if only in a way that emphasizes more sharply than ever the need for more precise methods.

SECTION 2.—*Interrelation of alpha and beta tests.*

The following regression equations are by-products of the study outlined in the preceding section. They are added because they tell a condensed story of the interdependence of the tests, and because they are of practical value in predicting probable scores on tests in which individuals may have for various reasons failed to score.

All of these equations were calculated directly from the correlation determinant given in table 155, the alpha-alpha section, and by the formula given on page —. Some of the longer equations are given in two forms: In the usual form, $X_1 = a + b_2X_2 + b_3X_3 + \quad . \quad . \quad . \quad b_nX_n$; and, secondly, in the form

$$\frac{X_1}{\sigma_1} = -\left\{\frac{R_{12}}{R_{11}} \cdot \frac{X_2}{\sigma_2} + \frac{R_{13}}{R_{11}} \cdot \frac{X_3}{\sigma_3} + \quad . \quad . \quad . \quad \frac{R_{1n}}{R_{11}} \cdot \frac{X_n}{\sigma_n}\right\}$$

In this form $\frac{R_{1i}}{R_{11}}$ is simply the ratio of two determinants, and the coefficients in the equations are in a more elemental form and resemble more closely the partial coefficients of correlation.[1] Hence, they tell a simpler story about the interdependence of the tests than they do after each has been multiplied by the ratio of the standard deviations. A single glance at one of these equations tells immediately the extent to which the test named in the left-hand member of the equation is dependent on the various tests on the right-hand side.

$$A_1 = 1.33 + 0.564A_2$$
$$A_1 = 2.73 + 0.461A_3$$
$$A_1 = 3.31 + 0.187A_8$$
$$A_1 = 1.28 + 0.505A_2 + 0.079A_3$$
$$A_1 = 1.55 + 0.415A_2 + 0.074A_8$$
$$A_1 = 1.31 + 0.426A_2 - 0.028A_3 + 0.079A_8$$
$$A_1 = 2.99 + 0.224A_2 - 0.101A_3 + 0.066A_4 + 0.044A_5 + 0.126A_6 + 0.035A_7 + 0.005A_8$$
$$a_1 = 0.290a_2 - 0.129a_3 + 0.262a_4 + 0.106a_5 + 0.183a_6 + 0.129a_7 + 0.018a_8$$

$$\begin{aligned} A_2 &= 2.30 + 0.946A_1 \\ &= 2.88 + 0.755A_3 \\ &= 4.24 + 0.275A_8 \\ &= 1.29 + 0.578A_1 + 0.489A_3 \\ &= 1.62 + 0.489A_1 + 0.355A_3 + 0.082A_8 \\ &= 2.74 + 0.255A_1 + 0.214A_3 + 0.043A_4 + 0.049A_5 + 0.276A_6 + 0.028A_7 - -0.015A_8 \end{aligned}$$
$$a_2 = 0.174a_1 + 0.211a_3 + 0.189a_4 + 0.092a_5 + 0.307a_6 + 0.080a_7 - -0.040a_8$$

$$\begin{aligned} A_3 &= 2.05 + 0.755A_1 \\ &= 0.69 + 0.736A_2 \\ &= 3.27 + 0.480A_6 \\ &= 3.77 + 0.206A_8 \\ &= 0.53 + 0.124A_1 + 0.666A_2 \\ &= 2.32 + 0.186A_1 + 0.181A_2 + 0.239A_5 \\ &= 1.92 - 0.035A_1 + 0.387A_2 + 0.138A_8 \\ &= 1.78 - 0.023A_1 + 0.433A_2 - 0.046A_6 + 0.133A_8 \\ &= 2.05 - 0.044A_1 + 0.357A_2 + 0.132A_5 - 0.016A_6 + 0.083A_8 \\ &= 3.08 - 0.126A_1 + 0.265A_2 + 0.113A_4 + 0.052A_5 - 0.056A_6 + 0.031A_7 + 0.088A_8 \end{aligned}$$
$$a_3 = -0.098a_1 + 0.269a_2 + 0.351a_4 + 0.099a_5 - 0.063a_6 + 0.089a_7 + 0.242a_8$$

$$\begin{aligned} A_4 &= -9.74 + 2.818A_1 \\ &= -12.37 + 2.427A_2 \\ &= -9.63 + 2.500A_3 \\ &= -5.70 + 1.868A_6 \\ &= -5.91 + 1.00A_8 \\ &= -13.86 + 1.12A_1 + 1.80A_2 \\ &= -13.52 + 1.42A_1 + 1.84A_3 \\ &= -9.22 + 1.00A_1 + 0.788A_8 \\ &= -12.68 + 1.35A_2 + 0.690A_8 \\ &= -14.61 + 0.940A_1 + 0.844A_2 + 1.43A_3 \\ &= -13.66 + 1.02A_1 + 1.62A_2 + 0.272A_6 \\ &= -9.27 + 0.561A_1 + 0.894A_2 + 0.834A_5 \\ &= -10.55 + 0.509A_1 + 0.479A_2 + 0.681A_3 - 0.157A_6 + 0.129A_7 + 0.508A_8 \\ &= -9.39 + 0.482A_1 + 0.444A_2 + 0.427A_3 + 0.330A_5 - 0.087A_6 + 0.417A_8 \\ &= -10.12 + 0.451A_1 + 0.418A_2 + 0.619A_3 + 0.283A_5 - 0.129A_6 + 0.070A_7 + 0.427A_8 \end{aligned}$$
$$a_4 = 0.114a_1 + 0.136a_2 + 0.199a_3 + 0.172a_5 - 0.047a_6 + 0.066a_7 + 0.377a_8$$

[1] All that is needed to convert these into partial coefficients of correlation, is to multiply each one by its appropriate $\sqrt{\frac{R_{ii}}{R_{11}}}$. See the formulæ at the end of the section.

$$
\begin{aligned}
A_5 &= -2.85 + 1.66A_1 \\
&= -4.37 + 1.43A_2 \\
&= -2.49 + 1.43A_3 \\
&= -0.62 + 1.13A_6 \\
&= -0.51 + 0.567A_8 \\
&= -5.26 + 0.667A_1 + 1.05A_2 \\
&= -4.93 + 0.896A_1 + 1.02A_3 \\
&= -2.56 + 0.617A_1 + 0.452A_8 \\
&= -3.20 + 0.635A_2 + 0.394A_8 \\
&= -5.65 + 0.575A_1 + 0.555A_2 + 0.743A_3 \\
&= -3.75 + 0.348A_1 + 0.491A_2 + 0.369A_8 \\
&= -4.16 + 0.358A_1 + 0.358A_2 + 0.343A_3 + 0.305A_8 \\
&= -7.66 + 0.298A_1 + 0.310A_2 + 0.278A_3 + 0.089A_7 + 0.282A_8 \\
&= -2.87 + 0.245A_1 + 0.243A_2 + 0.206A_3 + 0.313A_4 + 0.046A_6 + 0.213A_8 \\
&= -0.226 + 0.138A_1 + 0.153A_2 + 0.132A_3 + 0.130A_4 - 0.077A_6 + 0.191A_7 + 0.223A_8 \\
a_5 &= +0.057a_1 + 0.082a_2 + 0.070a_3 + 0.213a_4 - 0.046a_6 + 0.294a_7 + 0.322a_8
\end{aligned}
$$

$$
\begin{aligned}
A_6 &= 0.78 + 0.986A_1 \\
&= -0.258 + 0.864A_2 \\
&= 1.96 + 0.694A_3 \\
&= 2.80 + 0.287A_8 \\
&= -0.74 + 0.359A_1 + 0.662A_2 \\
&= 0.027 + 0.708A_1 + 0.368A_3 \\
&= 0.90 + 0.573A_1 + 0.179A_8 \\
&= -1.00 + 0.351A_1 + 0.618A_2 + 0.103A_3 \\
&= -0.37 + 0.282A_1 + 0.527A_2 + 0.089A_8 \\
&= -0.28 + 0.279A_1 + 0.553A_2 - 0.067A_3 + 0.101A_8 \\
&= -0.38 + 0.284A_1 + 0.545A_2 - 0.057A_3 - 0.025A_4 + 0.025A_5 + 0.106A_8 \\
&= +0.346 + 0.228A_1 + 0.493A_2 - 0.081A_3 - 0.031A_4 - 0.044A_5 + 0.099A_7 + 0.119A_8 \\
a_6 &= 0.157a_1 + 0.441a_2 - 0.071a_3 - 0.094a_4 - 0.074a_5 + 0.254a_7 + 0.288a_8
\end{aligned}
$$

$$
\begin{aligned}
A_7 &= -9.39 + 2.497A_1 \\
&= -11.47 + 2.12A_2 \\
&= -7.66 + 1.95A_3 \\
&= -4.15 + 0.715A_8 \\
&= -12.88 + 1.05A_1 + 1.52A_2 \\
&= -11.93 + 1.56A_1 + 1.24A_3 \\
&= -9.12 + 1.50A_1 + 0.434A_8 \\
&= -9.08 + 0.577A_1 + 0.757A_2 + 0.727A_5 \\
&= -19.28 + 0.669A_1 + 1.50A_2 + 0.710A_8 \\
&= -12.32 + 0.805A_1 + 1.06A_2 + 0.697A_6 \\
&= -12.67 + 0.883A_1 + 0.947A_2 + 0.555A_3 + 0.133A_8 \\
&= -11.89 + 0.845A_1 + 0.758A_2 + 0.597A_6 + 0.181A_8 \\
&= -11.49 + 0.557A_1 + 0.672A_2 + 0.419A_3 + 0.234A_4 + 0.644A_6 - 0.051A_8 \\
&= -8.22 + 0.390A_1 + 0.308A_2 + 0.276A_3 + 0.115A_4 + 0.683A_5 + 0.612A_6 - 0.196A_8 \\
a_7 &= 0.105a_1 + 0.197a_2 + 0.095a_3 + 0.123a_4 + 0.443a_5 + 0.238a_6 - 0.185a_8
\end{aligned}
$$

$$
\begin{aligned}
A_8 &= -0.65 + 2.306A_1 \\
&= -2.96 + 2.00A_2 \\
&= -1.03 + 2.12A_3 \\
&= +1.72 + 1.675A_8 \\
&= -4.11 + 0.869A_1 + 1.51A_2 \\
&= -2.156 + 1.08A_1 + 1.33A_3 \\
&= -4.82 + 0.709A_1 + 0.644A_2 + 1.31A_3 \\
&= -3.70 + 0.662A_1 + 1.13A_2 + 0.584A_6 \\
&= +2.17 + 0.032A_1 + 0.094A_2 + 0.454A_3 + 0.400A_4 + 0.497A_5 + 0.422A_6 - 0.112A_7 \\
a_8 &= +0.009a_1 + 0.035a_2 + 0.166a_3 + 0.454a_4 + 0.314a_5 + 0.175a_6 - 0.119a_7
\end{aligned}
$$

In addition to the foregoing equations, which are of practical value in calculating scores in the alpha examination which are interpretable as points upon a scale having nearly linear relationship with "intelligence" or the ability measured, we present the following equations of mainly theoretical interest. These equations connect each alpha test with all beta tests, and are given in the second of the two forms in which the equations connecting various alpha tests with each other are given, i. e., each variable, a_1, b_1, b_2, b_3, etc., is a deviation from the mean divided by the standard deviation. By means of the substitutions

$$a_1 = \frac{A_1 - M_{A_1}}{\sigma_{A_1}}, \quad b_1 = \frac{B_1 - M_{B_1}}{\sigma_{B_1}}, \quad \text{etc.},$$

where A_1, B_1, etc., are scores in points, and M_{A_1}, M_{B_1}, are corresponding means, scores in alpha tests might be predicted from scores in beta tests (provided none of these is zero) with a degree of accuracy indicated by the coefficients of maximum correlation, R, presented with each equation.

$$\begin{aligned}
a_1 &= 0.0069\,b_1 + 0.1960\,b_2 + 0.1259\,b_3 + 0.2624\,b_4 + 0.0582\,b_5 + 0.0706\,b_6 + 0.1427\,b_7 \quad (R = 0.7109)\\
a_2 &= 0.0231\,b_1 + 0.1894\,b_2 + 0.2022\,b_3 + 0.2546\,b_4 + 0.1720\,b_5 + 0.0626\,b_6 + 0.0097\,b_7 \quad (R = 0.7628)\\
a_3 &= -0.0566\,b_1 - 0.0316\,b_2 - 0.0021\,b_3 + 0.4185\,b_4 + 0.1159\,b_5 + 0.1027\,b_6 + 0.2727\,b_7 \quad (R = 0.7299)\\
a_4 &= 0.0369\,b_1 + 0.0501\,b_2 + 0.0907\,b_3 + 0.3377\,b_4 + 0.0283\,b_5 + 0.1361\,b_6 + 0.1577\,b_7 \quad (R = 0.6964)\\
a_5 &= 0.0191\,b_1 + 0.1579\,b_2 + 0.0503\,b_3 + 0.2822\,b_4 + 0.1478\,b_5 + 0.1382\,b_6 + 0.0469\,b_7 \quad (R = 0.6985)\\
a_6 &= 0.0100\,b_1 + 0.2106\,b_2 + 0.1286\,b_3 + 0.1085\,b_4 + 0.1927\,b_5 + 0.0223\,b_6 + 0.2213\,b_7 \quad (R = 0.7315)\\
a_7 &= 0.0705\,b_1 - 0.1144\,b_2 + 0.1606\,b_3 + 0.3357\,b_4 + 0.0862\,b_5 + 0.0252\,b_6 + 0.2368\,b_7 \quad (R = 0.6889)\\
a_8 &= -0.0674\,b_1 - 0.0400\,b_2 + 0.1278\,b_3 + 0.3365\,b_4 + 0.0699\,b_5 + 0.2454\,b_6 + 0.1537\,b_7 \quad (R = 0.7261)
\end{aligned}$$

Comparison of the above R's with the correlation of each alpha test with beta total score (see Table 155) indicates two things: (1) That the method of calculating correlation coefficients from truncated frequency surfaces made use of in this chapter has been practically a valid one, since we obtain consistent series of correlations of variables with weighted and with unweighted sums of other variables, and (2) that weight of scores in beta is of no practical value in obtaining scores maximally comparable with alpha scores. Hence our original use of the sum of unweighted scores in all tests as the definition of the combined scale for the measurement of intelligence is not in error for all practical purposes in so far as the internal evidence of the system is relevant.

In a footnote at the beginning of this section reference was made to the fact that the partial coefficients of correlation could be obtained by multiplying each term in the regression equation by its appropriate $\sqrt{\frac{R_{11}}{R_{11}}}$ provided the equation is left in the form $\frac{x_1}{\sigma_1} = -\left\{\frac{R_{12}}{R_{11}}\frac{x_2}{\sigma_2} + \frac{R_{13}}{R_{11}}\frac{x_3}{\sigma_3} + \cdots \text{etc.}\right\}$.

It has been shown by Prof. Pearson[1] that the partial correlation between any two variables, x_i and x_j, of a system of n correlated variables, $x_1, x_2, x_3, \cdots x_n$, with all the others kept constant is given by:

$$r_{ij \cdot 12 \cdots\cdots n} = -\frac{-R_{ij}}{\sqrt{R_{ii}\,R_{jj}}}$$

This may be written:

$$r_{ij \cdot 12 \cdots\cdots n} = -\frac{R_{ij}}{R_{ii}}\frac{\sqrt{R_{ii}}}{\sqrt{R_{jj}}}$$

thus exhibiting the relation between the coefficients in a multiple regression equation and the corresponding partial correlation coefficients.

$$\gamma\ 12.34 \cdots n = -\frac{R_{12}}{R_{11}}\sqrt{\frac{R_{11}}{R_{22}}}$$

$$= \frac{-R_{12}}{\sqrt{R_{11}}\sqrt{R_{22}}}$$

[1] Pearson, K: Phil. Trans. Roy. Soc., Series A, vol. 200, pp. 1 ff.

TABLE 164.—*Table of partial correlations between all pairs of alpha tests.*

	A1.	A2.	A3.	A4.	A5.	A6.	A7.	A8.
A1	1	0.2246	−0.1126	0.1725	0.0780	0.1698	0.1165	0.0127
A2	.2246	1	.2382	.1604	.0867	.3678	.0924	−.0372
A3	−.1126	.2382	1	.2644	.0831	−.0672	.0918	.2001
A4	.1725	.1604	.2644	1	.1916	−.0664	.0899	.4135
A5	.0780	.0867	.0831	.1916	1	−.0581	.3612	.3184
A6	.1698	.3678	−.0672	−.0664	−.0581	1	.2458	.2241
A7	.1165	.0924	.0918	.0899	.3612	.2458	1	−.1486
A8	.0127	−.0372	.2001	.4135	.3184	.2241	−.1486	1

Comparing the coefficients of table 164 with those in the alpha-alpha section of table 155, we see at once the extent to which the correlation there exhibited between any pair of alpha tests is actually due the correlation of each member of the pair with other alpha tests. Table 164 shows the amounts of actual resemblance between tests so far only as the alpha system is concerned.

It is entirely beyond the limits of time to attempt a general discussion of the interrelation of tests as displayed in the above table. However, these correlations have yielded some rather unexpected results. For example, the highest coefficient in the table is that between A4 and A8. The high partial correlation between A5 and A7 is also surprising. On the surface the task set by test 4 does not appear to resemble that of test 8, nor does test 5 seem to resemble test 7, yet the facts are otherwise. Another interesting feature of the above table is that, aside from the high partial correlations just referred to, the table shows that the alpha tests constitute a fairly discontinuous system. The tests also show another and somewhat contrary tendency, viz, that the system would not be seriously injured by omitting as many as three or four of the tests.

SECTION 3.—*Application to main groups of principal sample.*

Unfortunately the foregoing method was not completed in time to permit its application to all of the subgroups of the principal sample. It was applied, however, to the main groups of the sample. The results are exhibited in figure 7 and in table 165. In each group the alpha distribution was distributed on the combined scale by the use of table 159, the beta distribution by table 162, and the Stanford-Binet mental age distribution by table 163. The performance scale distributions and the point scale distributions were handled in the following way: The performance distributions were first transformed into Stanford-Binet mental age distributions by the use of the regression formula: M. A. (in years) $=\frac{0.50 \text{ Perf. score}+72}{12}$. This formula was derived from the correlation of a sample of 350 cases who had both Stanford-Binet mental age ratings and performance scale ratings. The point scale distributions were transformed into Stanford-Binet mental age distributions by the use of the table in the examiner's guide, Part I, pages 195ff. These transformations only approximate the truth, but owing to the fact that the performance and point scale cases constitute less than 3 per cent of any group handled it would take a considerable error in transformation seriously to affect the whole.

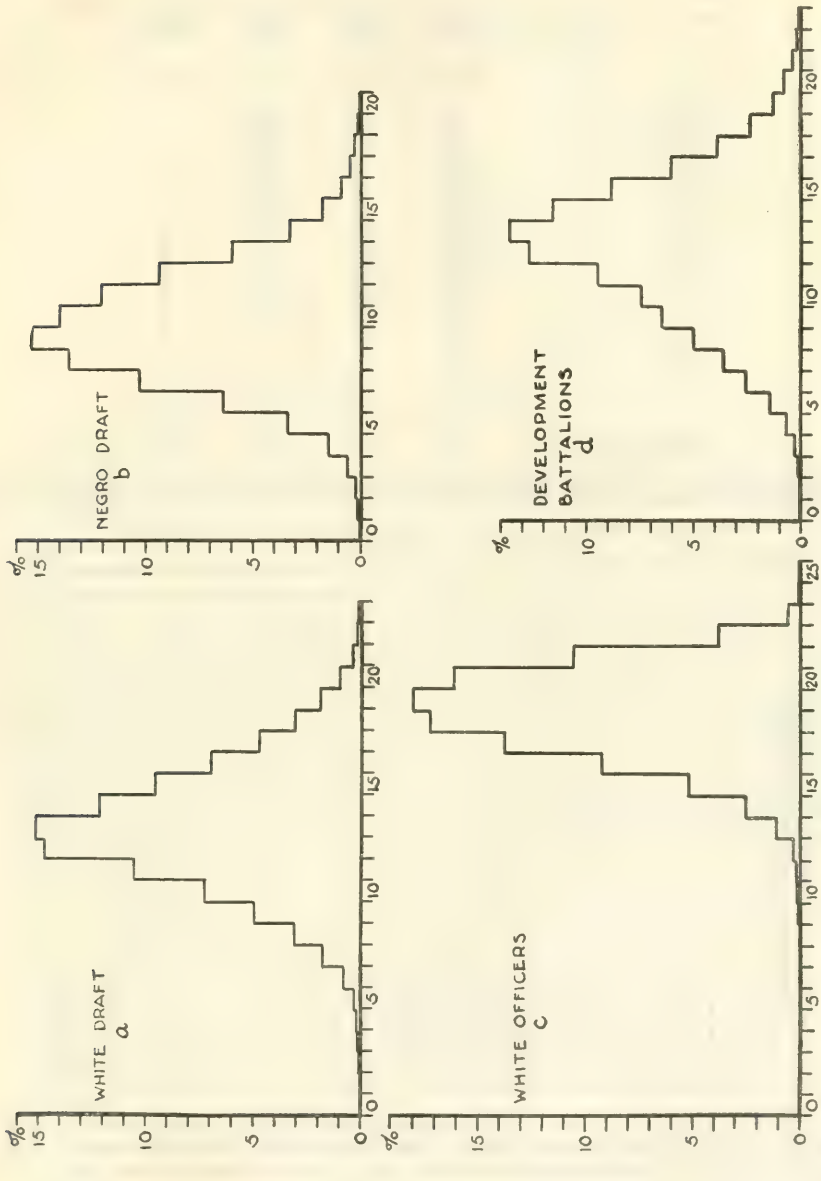

FIG. 7. Histograms of main groups of the principal sample in terms of combined scale. (a) Group I, II, and III (white draft), 93,905 cases; (b) Group IV (negro draft), 18,892 cases; (c) Group VII (white officers), 15,341 cases; (d) development battalions, 1,976 cases. Horizontal scale is class intervals on the combined scale; vertical scale is percentage of cases.

TABLE 165.—*Distributions on the combined scale of the main groups of the sample.*

Combined scale in class intervals.	Groups I, II, and III, white draft.	Groups IV and V, colored draft.	Group VIII, white officers.	Development battalions (Group VIII).
	Frequency.	*Frequency.*	*Frequency.*	*Frequency.*
25.0–25.9	.....	.....	1	.....
24.0–24.9	6	0	6	0
23.0–23.9	15	0	106	1
22.0–22.9	122	0	612	3
21.0–21.9	437	2	1,648	7
20.0–20.9	1,000	7	2,522	16
19.0–19.9	1,787	17	2,836	27
18.0–18.9	2,953	50	2,698	47
17.0–17.9	4,580	91	2,155	78
16.0–16.9	6,634	182	1,454	121
15.0–15.9	9,050	332	837	175
14.0–14.9	11,572	607	412	230
13.0–13.9	14,229	1,132	179	270
12.0–12.9	13,940	1,776	60	251
11.0–11.9	10,036	2,283	14	187
10.0–10.9	6,887	2,682	3	149
9.0– 9.9	4,770	2,903	1	130
8.0– 8.9	2,951	2,584	.....	102
7.0– 7.9	1,681	1,953	.....	76
6.0– 6.9	808	1,216	.....	52
5.0– 5.9	333	646	.....	28
4.0– 4.9	122	290	.....	15
3.0– 3.9	38	110	.....	6
2.0– 2.9	11	40	.....	2
1.0– 1.9	3	7	.....	.....
0.0– 0.0	.....	2	.....	.....
Cases	93,965	18,892	15,544	1,973
Means	13.46	9.98	18.84	12.71
Standard deviations	2.94	2.68	2.10	3.32
Mean in mental age.....years	13.08	10.37	17.26	12.49

The means in mental ages were calculated from the regression of combined scale on mental age, which is: M. A. (in years)=0.778 C. S. + 2.606. They are given in order that persons accustomed to thinking in terms of mental age can readily adjust themselves to the combined scale.

TABLE 166.—*Variables: Alpha score × beta score. Groups I, II, III: White draft.*

For men who took beta following alpha, or who took alpha, beta, and an individual examination.

Alpha score.	Beta score.																									Total.
	0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–118		
145–149	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....		1
140–144	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....		1
135–139	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....		1
130–134	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....		1
125–129	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	1	....	....	....		2
120–124	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....		1
115–119	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....	....	....	....		2
110–114	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	1	....	....	....		2
105–109	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	1	....	....	....	....		2
100–104	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	2	....	....	1	....	....	....	....		4
95– 99	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1	1	....	....	1	....	....	....	....	....		4
90– 94	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	....	....	1	1	....	....	....		4
85– 89	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	1	1	....		3
80– 84	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	2	1	1	....	1	....	....	....		7
75– 79	....	....	....	....	....	....	....	....	....	....	....	2	....	....	1	....	1	....	1	....	1	....	....	....		6
70– 74	....	....	....	....	....	....	....	....	....	1	....	....	3	....	2	2	....	....	1	2	....	....	....	....		11
65– 69	....	....	....	....	....	....	....	....	....	1	....	....	....	....	1	1	....	....	1	....	....	....	....	....		4
60– 64	....	....	....	....	....	....	....	....	....	....	1	1	1	2	....	4	1	3	1	....	....	....	....	....		14
55– 59	....	....	....	....	....	....	....	....	1	2	1	6	4	7	5	2	2	2	....	....	1	....	....	....		33
50– 54	....	....	....	....	....	....	2	....	3	1	1	3	2	3	5	4	4	1	....	....	....	....	....	....		29
45– 49	....	....	....	....	....	....	1	....	1	....	4	2	5	4	10	6	4	2	1	1	....	....	....	....		41
40– 44	....	....	....	....	....	1	....	2	3	6	3	2	4	8	8	9	8	1	1	2	....	....	....	....		58
35– 39	1	....	....	....	....	....	....	1	5	3	9	12	14	16	10	10	5	3	5	....	....	....	....	....		94
30– 34	2	....	....	1	....	2	4	1	1	9	10	13	19	15	11	13	8	2	1	2	....	....	....	....		114
25– 29	....	....	1	2	1	3	5	8	15	21	29	28	24	46	38	31	20	11	4	3	1	....	....	....		291
20– 24	....	1	....	3	8	17	16	31	31	42	52	60	58	52	56	34	23	12	4	8	3	....	....	....		511
15– 19	2	....	2	7	18	27	33	46	61	73	83	86	85	67	45	36	27	12	7	7	2	1	....	1		728
10– 14	....	5	11	28	61	109	129	133	140	179	133	136	114	81	62	35	20	10	10	3	2	1	....	....		1,402
5– 9	3	10	18	55	83	97	101	114	108	98	95	60	63	47	32	13	1	12	3	1	....	....	....	....		1,014
0– 4	8	14	20	49	56	70	54	49	44	52	28	18	21	12	4	2	5	1	....	....	1	....	....	....		508
Total	16	30	52	145	227	326	345	386	413	489	449	430	417	361	292	204	137	75	45	34	15	3	1	1		4,893

Table 166 exhibits the relation between alpha and beta for all individuals in Groups I, II, III of the principal sample who had both of these examinations. The alpha distribution of this table was turned into the combined scale by way of table 159, and the beta distribution by way of table 162. The results are given in table 167.

TABLE 167.

Combined scale in class intervals.	Alpha distribution of table 166 on combined scale.	Beta distribution of table 166 on combined scale.
22.0–22.9	.....	.....
21.0–21.9	.....	1
20.0–20.9	1	5
19.0–19.9	2	16
18.0–18.9	4	43
17.0–17.9	7	102
16.0–16.9	12	200
15.0–15.9	20	338
14.0–14.9	55	485
13.0–13.9	216	634
12.0–12.9	662	713
11.0–11.9	1,230	688
10.0–10.9	1,255	613
9.0– 9.9	824	492
8.0– 8.9	377	307
7.0– 7.9	152	159
6.0– 6.9	54	66
5.0– 5.9	16	18
4.0– 4.9	4	7
3.0– 3.9	.....	2
2.0– 2.9	.....	1
Total	4,891	4,891
Mean	10.775	12.158
Standard deviation	1.64	2.63

At first glance these results seem rather startling, for one might suppose that going from alpha (for a given number of cases) to the combined scale ought to yield the same results as going from beta to combined scale. These facts are quite the contrary. However, this difference in no wise discredits the method. It must be remembered that in a group of this sort there is a large percentage of illiterates; thus the group no doubt includes a considerable proportion of the cases who made unsatisfactory scores in alpha and were recalled to beta not because of stupidity but because of language difficulty. When they reached beta, they were able to make scores more consistent with their ability. It is precisely this element of the group that causes the difference in the two means on the combined scale. The same fact explains the wide differences in the standard deviations. The standard deviation of the combined scale distribution when reached by way of beta is larger than by way of alpha. Here the difference is no doubt due to the fact that in alpha both the stupid and the non-English speaking piled up in the lower class intervals, while in beta the stupid remained in the lower ranges and the more intelligent went higher, thus increasing the standard deviation.

The six tables 168 to 173 exhibit the cases of the principal sample of the white draft who were recalled from examination alpha to one of the three types of individual examination or from examination beta to one of the three types of individual examination. Unfortunately there has not been time for the statistical treatment of these tables.

TABLE 168.—*Variables: Alpha score × score on performance scale examination. Groups I, II, III: White draft.*

For men who took performance scale examination following alpha or following alpha and beta.

Alpha score.	Total score on performance scale examination.																Total.
	40–49	50–59	60–69	70–79	80–89	90–99	100–109	110–119	120–129	130–139	140–149	150–159	160–169	170–179	180–189	190–199	
25–29	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	2
20–24	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	1	.....	.....	3
15–19	.....	.....	1	.....	.....	.....	1	.....	1	.....	.....	.....	.....	.....	.....	1	4
10–14	.....	1	.....	.....	2	1	.....	1	.....	1	2	1	.....	.....	1	.....	10
5– 9	.....	1	2	1	1	1	1	1	1	1	4	.....	1	1	.....	2	18
0– 4	.....	1	2	2	1	1	1	.....	4	2	2	.....	1	1	.....	1	19
Total	1	3	5	3	4	3	3	2	6	5	9	2	2	3	1	4	56

TABLE 169.—*Variables: Alpha score × score on point scale examination. Groups I, II, III: White draft.*

For men who took point scale examination following alpha or following alpha and beta.

Alpha score.	Total score on point scale examination.															Total.
	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	
95–99												1				1
45–49										1						1
40–44																0
35–39				1												1
30–34										1						1
25–29																0
20–24										1	1		1			3
15–19					1		1	3	2							7
10–14	1			1		2	3	7	4	8	1	3				30
5– 9			1	3	1	2	4	9	2	5	3	2			1	33
0– 4				2	4	5	4	4	3	2						24
Total	1	0	1	7	6	9	12	23	11	18	5	6	1	0	1	101

TABLE 170.—*Variables: Alpha score × score on Stanford-Binet examination. Groups I, II, III: White draft.*

For men who took Stanford-Binet examination following alpha, or following alpha and beta.

Alpha score.	Mental age on Stanford-Binet examination.																							Total.
	5.0– 5.4	5.5– 5.9	6.0– 6.4	6.5– 6.9	7.0– 7.4	7.5– 7.9	8.0– 8.4	8.5– 8.9	9.0– 9.4	9.5– 9.9	10.0–10.4	10.5–10.9	11.0–11.4	11.5–11.9	12.0–12.4	12.5–12.9	13.0–13.4	13.5–13.9	14.0–14.4	14.5–14.9	15.0–15.4	15.5–15.9	16.0–16.4	
105–109																				1				1
100–104									1															1
95– 99																								0
90– 94																					1			1
85– 89																								0
80– 84																						1		1
75– 79																								0
70– 74																	1					1		2
65– 69																								0
60– 64									1															1
55– 59	1										1								1					3
50– 54									1	1		1												3
45– 49														1				1					1	4
40– 44															1									1
35– 39					1					1		1							1	1				5
30– 34															1									1
25– 29												1	1	1	1		1				1			6
20– 24			1		1				3	1	1			1	2									10
15– 19								1	6	3	2				1									13
10– 14							1	5	5	5	7	4	11	2	2		1							43
5– 9				1	1	1	3	5	15	9	10	7	3	3	3	1	2		1					65
0– 4	1				1	2	1	4	13	4	8	4	2	2	2									44
Total	2	0	1	1	4	3	5	15	45	24	29	18	17	10	13	1	5	1	3	3	2	2	1	205

TABLE 171.—*Variables: Beta score × score on performance scale examination. Groups I, II, III: White draft.*

For men who took the performance scale examination following beta, or following alpha and beta.

Beta score.	Total score on performance scale examination.																							Total.
	0– 9	10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100–109	110–119	120–129	130–139	140–149	150–159	160–169	170–179	180–189	190–199	200–209	210–219	220–229	
75–79						1																		1
12 {55–59													1										1	2
{50–54																	1							1
11 {45–49																								0
{40–44						1			1				1					1						4
10 35–39					2									1							2			5
{30–34									2	1	2	1		2	4	1	1							14
9 {25–29						1	1	1	3	1	4	3	3	3	3	3	5	1	2		1			35
{20–24		1	1	2	1	5	4	8	5	7	11	7	3	3	5	4	3	1	1					72
8 {15–19			3	7	7	15	30	26	17	22	18	10	15	7	7	6	4	4	1	1	1	1		202
{10–14	2	3	8	11	20	40	37	37	28	28	25	17	12	15	10	5	7	4	2	1			1	313
7 {5– 9	2	9	9	17	16	33	41	20	24	16	20	5	10	8	5	2	5	2	2	1				247
{0– 4	1	9	6	13	20	17	23	18	16	10	6	3	5		7	2		1						157
Total	5	22	27	50	66	113	136	110	96	85	86	46	50	39	41	23	26	14	8	3	4	1	2	1,053

TABLE 172.—*Variables: Beta score × score on point scale examination. Groups I, II, III: White draft.*

For men who took the point scale examination following beta, or following alpha and beta.

Beta score.	Total score on point scale examination.																			Total.
	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	
35–39										1										1
30–34																				0
15–19																				0
10–14								1												1
35–39											1					1				2
30–34								1						1						2
25–29									1	1		1						1		4
20–24							1	2	1	2	3	4		3	1					17
15–19				1	2	1	5	7	11	24	28	33	10	12	1	3	4	2	2	146
10–14				1	1	2	8	8	14	36	32	28	13	18	4	3	2	1		171
5– 9					2		6	9	17	18	18	16	9	4	3	1		1	1	105
0– 4	1				1	4	4	6	8	8	10	10	3					1		56
Total	1	0	0	2	6	7	24	34	52	90	92	92	35	38	9	8	6	6	3	505

TABLE 173.—*Variables: Beta score × score in Stanford-Binet examination. Groups I, II, III: White draft.*

For men who took Stanford-Binet examination following beta, or following alpha and beta.

MENTAL AGE ON STANFORD-BINET EXAMINATION.

Beta score.	Mental age on Stanford-Binet examination.																					Total.
	5.0–5.4	5.5–5.9	6.0–6.4	6.5–6.9	7.0–7.4	7.5–7.9	8.0–8.4	8.5–8.9	9.0–9.4	9.5–9.9	10.0–10.4	10.5–10.9	11.0–11.4	11.5–11.9	12.0–12.4	12.5–12.9	13.0–13.4	13.5–13.9	14.0–14.4	14.5–14.9	15.0–15.4	15.5–15.9	
90–94																					1		1
85–89																							0
80–84													1										1
75–79																				1		1	2
70–74						1											1	1					3
65–69														1	1								2
60–64																						1	1
55–59									1	1									1				3
50–54										1				1	1		1						4
45–49										2										1			3
40–44										1		2	1							1			5
35–39					1				1	1						1							4
30–34									2	2		1	1	2	1								9
25–29									2	2	8		1		2						1		16
20–24					1	3	3	9	22	5	5	2	2	1	2								55
15–19	1		2	1	2	5	14	23	50	36	36	16	23	9	12		3		4	1			238
10–14	3	1	2	2	6	4	23	29	61	30	24	22	16	6	4	1	2						236
5– 9		1		5	8	5	12	28	36	19	13	10	6	1	1	1	1		1		1		149
0– 4	1		3	5	4	4	18	13	16	2	6	1	3	2	1								79
Total	5	2	7	13	22	22	70	102	191	102	92	54	54	23	25	3	8	1	6	4	3	2	811

CHAPTER 3.

COMPARISON OF FORMS OF EXAMINATION ALPHA.

Five forms of examination alpha, numbered consecutively from 5 to 9, were used. The tests in each form were of the same types and arranged in the same order. The items differed, but their difficulty had been carefully adjusted in an attempt to secure equivalence of each form of each test with any other form of that test. These forms are reproduced in Part I, pp. 220 to 234. The data have not been analyzed test by test to see whether this ideal was reached, but a comparison based on total scores is available. The principal Hollerith sample of alpha scores of the white draft (Group I) given alpha included 31,967 cases, in which the form used had been recorded; 2,448 of these had been given beta also. These two groups were each sorted according to form of alpha used, and comparisons made between the distributions of alpha scores on each form. The distributions in both actual numbers of cases and percentages appear in tables 174 and 175. Similar procedure was attempted with the principal Hollerith sample of the negro draft (Group IV), but the numbers proved too small to make comparison valid.

For the white draft the comparitive means, standard deviations, and probable errors were computed, and are shown in table 176.

TABLE 174.—*Variables: Alpha score × alpha form. Group I: White draft.*

For men who took alpha only.

Alpha score.	Number.					Per cent.					
	Form 5.	Form 6.	Form 7.	Form 8.	Form 9.	Form 5.	Form 6.	Form 7.	Form 8.	Form 9.	Total.
205–212	1				1	0.0				0.0	2
200–204	1	1				.0	0.0				2
195–199	3	3	1	5	3	.0	.1	0.0	0.1	.1	15
190–194	7	1	4	2	1	.1	.0	.1	.0	.0	15
185–189	11	3	6	6	2	.2	.1	.1	.1	.0	28
180–184	8	5	8	8	4	.1	.1	.1	.2	.1	33
175–179	19	7	16	8	4	.3	.1	.2	.2	.1	54
170–174	26	11	37	8	13	.4	.2	.5	.2	.2	95
165–169	30	17	37	13	17	.5	.3	.5	.3	.3	114
160–164	29	22	49	16	23	.5	.4	.6	.3	.4	139
155–159	58	27	60	24	23	.9	.5	.8	.5	.4	192
150–154	63	33	56	27	21	1.0	.6	.7	.6	.4	200
145–149	49	41	73	43	37	.8	.8	1.0	.9	.6	243
140–144	55	31	79	49	45	.9	.6	1.0	1.0	.8	259
135–139	73	54	94	44	48	1.2	1.0	1.2	.9	.8	313
130–134	64	56	110	56	80	1.0	1.1	1.5	1.2	1.4	366
125–129	98	78	117	67	79	1.6	1.5	1.6	1.4	1.4	439
120–124	104	74	120	59	76	1.7	1.4	1.6	1.2	1.3	433
115–119	125	88	125	86	110	2.0	1.7	1.7	1.8	1.9	534
110–114	165	111	158	91	106	2.7	2.1	2.1	2.0	1.8	634
105–109	165	110	176	117	129	2.7	2.1	2.3	2.5	2.2	697
100–104	180	129	177	110	144	2.9	2.4	2.3	2.3	2.5	740
95–99	177	162	192	112	177	2.9	3.1	2.5	3.0	3.1	850
90–94	223	181	230	168	198	3.6	3.4	3.0	3.5	3.4	1,000
85–89	238	188	264	159	206	3.9	3.6	3.5	3.3	3.6	1,055
80–84	236	196	269	168	215	3.8	3.7	3.0	3.5	3.7	1,114
75–79	278	222	298	181	230	4.5	4.2	3.9	3.9	4.0	1,210
70–74	291	225	317	232	263	4.7	4.2	4.2	4.9	4.6	1,328
65–69	298	263	311	223	263	4.8	5.0	4.2	4.7	4.6	1,361
60–64	319	281	386	220	292	5.2	5.3	5.1	4.6	5.1	1,498
55–59	301	283	415	250	331	4.9	5.3	5.5	5.2	5.8	1,580
50–54	327	283	388	268	318	5.3	5.3	5.1	5.6	5.5	1,584
45–49	314	287	462	261	385	5.1	5.4	6.1	5.5	6.7	1,709
40–44	315	295	443	264	361	5.1	5.6	5.9	5.5	6.3	1,678
35–39	372	315	424	285	339	6.1	5.9	5.6	6.0	5.9	1,735
30–34	320	313	414	295	329	5.2	5.9	5.5	6.2	5.7	1,671
25–29	259	288	355	253	320	4.2	5.4	4.7	5.3	5.6	1,475
20–24	202	248	322	206	240	3.3	4.7	4.3	4.3	4.2	1,218
15–19	173	211	268	155	182	2.8	4.0	3.6	3.2	3.2	989
10–14	79	65	108	79	63	1.3	1.2	1.0	1.7	1.1	394
5–9	51	52	73	60	44	.8	.9	1.0	1.3	.8	280
0–4	46	37	77	53	30	.7	.7	1.0	1.1	.5	243
Total	6,153	5,297	7,550	4,767	5,752	99.7	99.9	99.6	100.2	100.1	29,519

TABLE 175.—*Variables: Alpha score × alpha form. Group I: White draft.*

For men who took alpha only or alpha and beta.

Alpha score.	Number.					Per cent.					
	Form 5.	Form 6.	Form 7.	Form 8.	Form 9.	Form 5.	Form 6.	Form 7.	Form 8.	Form 9.	Total.
205–212	1	.....	.....	.....	1	0.0	.....	.....	.....	0.0	2
200–204	1	1	.....	.....	.....	.0	0.0	.....	.....	.....	2
195–199	3	3	1	5	3	.0	.1	0.0	0.1	.0	15
190–194	7	1	4	2	1	.1	.0	.0	.0	.0	15
185–189	11	3	6	6	6	.2	.1	.1	.1	.0	28
180–184	8	5	8	8	4	.1	.1	.1	.2	.1	33
175–179	19	7	16	8	4	.3	.1	.2	.2	.1	54
170–174	26	11	37	8	13	.4	.2	.5	.2	.2	95
165–169	30	17	37	13	17	.5	.3	.5	.3	.3	114
160–164	29	22	49	16	26	.4	.4	.6	.3	.4	139
155–159	58	27	60	24	23	.9	.5	.7	.5	.4	192
150–154	63	33	56	27	21	.9	.6	.7	.5	.3	200
145–149	49	41	73	43	38	.7	.7	.9	.8	.6	244
140–144	55	31	79	49	46	.8	.5	1.0	1.0	.7	260
135–139	73	54	94	44	48	1.2	.9	1.2	.9	.8	313
130–134	64	56	110	56	80	1.0	1.0	1.4	1.1	1.3	366
125–129	98	79	118	67	79	1.6	1.4	1.5	1.3	1.2	441
120–124	104	74	120	59	76	1.6	1.3	1.5	1.1	1.2	433
115–119	125	88	125	86	110	1.9	1.5	1.6	1.7	1.7	534
110–114	165	112	158	95	106	2.5	1.9	2.0	1.8	1.7	636
105–109	165	110	176	117	129	2.5	1.9	2.2	2.3	2.0	697
100–104	182	129	177	110	146	2.7	2.2	2.2	2.1	2.3	744
95– 99	177	162	192	142	177	2.7	2.8	2.4	2.8	2.8	850
90– 94	223	182	231	169	199	3.4	3.1	2.9	3.3	3.2	1,004
85– 89	238	190	264	159	206	3.6	3.3	3.3	3.1	3.3	1,057
80– 84	238	197	299	168	215	3.6	3.4	3.7	3.3	3.4	1,117
75– 79	281	222	297	184	230	4.2	3.8	3.7	3.6	3.6	1,214
70– 74	295	225	318	232	265	4.4	3.9	4.0	4.5	4.2	1,335
65– 69	299	264	314	223	263	4.5	4.6	3.9	4.3	4.2	1,363
60– 64	323	281	386	220	293	4.9	4.8	4.8	4.3	4.6	1,503
55– 59	312	285	416	253	334	4.7	4.9	5.2	4.9	5.3	1,600
50– 54	332	283	388	269	320	5.0	4.9	4.8	5.2	5.1	1,592
45– 49	320	293	464	262	388	4.8	5.0	5.8	5.1	6.1	1,727
40– 44	331	295	445	267	367	5.0	5.1	5.5	5.2	5.8	1,705
35– 39	381	321	428	287	347	5.7	5.5	5.3	5.6	5.4	1,764
30– 34	331	324	421	299	340	5.0	5.6	5.2	5.8	5.4	1,715
25– 29	300	317	373	281	354	4.5	5.5	4.6	5.5	5.6	1,625
20– 24	257	304	359	264	300	3.9	5.2	4.5	5.1	4.7	1,484
15– 19	246	280	336	224	300	3.7	4.8	4.2	4.3	4.7	1,386
10– 14	186	229	283	172	217	2.8	3.9	3.5	3.3	3.4	1,087
5– 9	137	153	188	153	155	2.1	2.6	2.3	3.0	2.5	786
0– 4	105	92	132	80	87	1.6	1.6	1.6	1.6	1.4	496
Total	6,648	5,803	8,038	5,151	6,327	100.4	100.0	100.1	100.3	100.0	31,967

TABLE 176.—*Constants for alpha scores for each form of alpha. (Group I: white draft).*

Form.	Cases.	Mean.	Standard deviation.	Probable error of mean.	Q_1.	Median.	Q_3.
5	6,648	66.81	39.38	0.325	36.2	61.2	91.5
6	5,803	60.85	37.47	.330	31.3	55.3	84.9
7	8,038	64.37	39.50	.295	34.1	57.6	88.6
8	5,151	61.70	37.99	.355	31.9	54.3	87.3
9	6,327	60.90	36.52	.310	32.5	53.9	82.9
Total	31,967	63.12	38.36	.145	33.3	56.9	87.25

It is evident that there are significant differences here. The difference for each pair of forms is shown below, table 177. The probable error of the difference is in all cases less than 0.012.

TABLE 177.—*Difference between mean scores, alpha forms.*

Form.	Difference between means	Form.	Difference between means.
5–6	5.96	6–8	−0.85
5–7	2.44	6–9	−.05
5–8	5.11	7–8	2.67
5–9	5.91	7–9	3.47
6–7	−3.85	8–9	.80
Probable error of difference lies between 0.009 and 0.011.			

The distribution of letter grades, as is shown in table 178, is affected by these differences in difficulty between forms.

TABLE 178.—*Per cent distribution of letter grades, alpha forms.*

Form.	D−.	D.	C−.	C.	C+.	B.	A.
5	6.4	7.6	20.2	28.3	20.1	10.8	6.5
6	8.2	10.1	21.7	28.1	18.6	8.9	4.4
7	7.5	8.6	20.7	28.4	18.2	10.0	6.5
8	7.9	9.5	22.0	28.3	18.1	9.3	4.9
9	7.3	9.5	22.3	29.4	18.5	9.2	3.9
Total	7.4	9.0	21.3	28.5	18.7	9.7	5.3

It is obvious that some of these differences are large enough to be "significant" in the mathematical sense not only, but also to be of importance in comparing the intelligence of groups. Form 5 is easier by about 6 points than forms 6, 8, and 9; form 6 is more difficult relatively at the lower end and form 9 at the upper end of the distribution, etc. A difference of 6 points between groups is great enough to appear significant even when the number of cases is relatively small and could lead to a "significant" but factitious intelligence difference between the two groups if one had been examined by form 5 and the other by form 6. All forms were sent in equal numbers to each camp, so that any large group selected at random is likely to include all forms in approximately equal proportions. (See tables 174 and 175.)

Figures 8 and 9 represent graphically these same data. Figure 8 compares the extreme forms, 5 and 6, and shows how small their difference is in relation to the whole range of alpha scores. Figure 9 is drawn in the same way as figures illustrating differences between organizations, between ranks, etc., and shows that some of these are not much greater than difference of form alone could introduce.

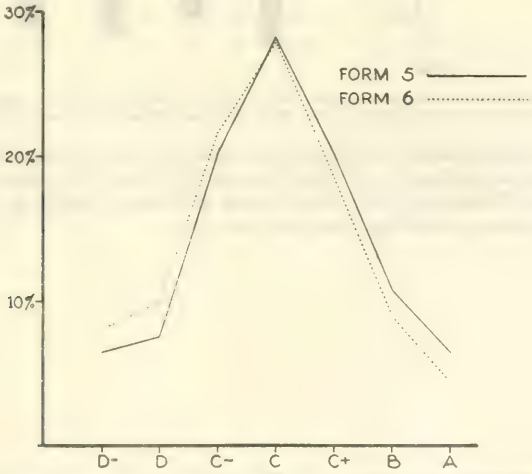

FIG. 8. Comparison of alpha forms. Percentage distribution of letter grades on form 5 (6,818 cases) and form 6 (5,803 cases), taken from the principal Hollerith sample, Group I (white draft). These forms are the extremes; form 5 is the easiest and form 6 the most difficult of the five. All other pairs show less difference.

Previous study of statistical reports on form differences sent in from several camps had shown substantially the same relation to exist between forms. These figures are here presented as corroborative evidence.

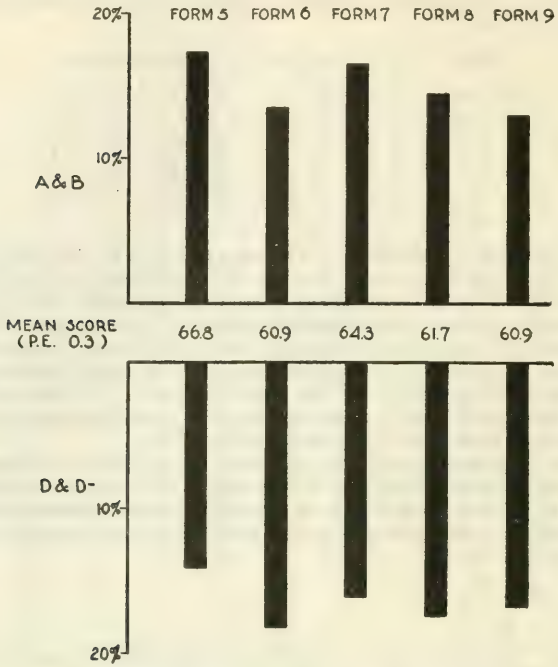

FIG. 9. Comparison of alpha forms. Percentages of A or B grades, and of D or D— grades, on each of the five forms. Form 5, 6,648 cases; form 6, 5,803 cases; form 7, 8,038 cases; form 8, 5,151 cases; form 9, 6,327 cases; all from principal Hollerith sample, Group I (white draft).

Distributions of total score on examination alpha for the five forms separately were at hand for five groups, totaling 19,907; draft groups from Camp Dix, 3,048; Jackson, 3,540; Sevier, 4,742; and Wadsworth, 7,481; and a group of officers from Camp Wadsworth, 1,096. Tables 179 to 181 present data from these distributions.

TABLE 179.—*Alpha medians and quartiles, by form.*

Form.	Number of cases.	Q_1.	Median.	Q_3.
Form 5 average[1]	5,357	35.75	61	89.9
Dix	1,209	36	63	91
Jackson	849	41	64	92
Sevier	890	29.5	53.5	84
Wadsworth	2,167	36.5	63.5	92.5
Wadsworth officers	242	109.5	130	149.5
Form 6 average	3,231	30.1	53.6	83
Dix	829	28	54	85
Jackson	156	37	57	86
Sevier	987	21	40	68
Wadsworth	1,090	34.5	63.5	93
Wadsworth officers	169	104	125	149.5
Form 7 average	3,298	30.75	53.9	83
Dix	562	30	54.5	81
Jackson	801	39	59	82
Sevier	1,014	22	42	70.5
Wadsworth	777	32	60	92.5
Wadsworth officers	144	101	126.5	147
Form 8 average	4,333	.....	.....	.....
Dix	0	.....	.....	.....
Jackson	917	39	59	88
Sevier	923	25.5	46	76
Wadsworth	2,161	32.5	57	87.5
Wadsworth officers	332	113	132.5	151
Form 9 average	3,688	31.5	54.75	84
Dix	448	30	56	83
Jackson	817	40	62	89
Sevier	928	23.5	43	73
Wadsworth	1,286	32.5	58	91
Wadsworth officers	209	116	133.5	151.5

[1] Average of medians and quartiles, officer group omitted.

TABLE 180.—*Mean alpha scores, by form.*

Form	5	6	7	8	9
Dix	67.1	60.3	63.3	.....	59.5
Jackson	70.0	65.4	65.3	67.3	68.4
Sevier	59.7	47.3	49.3	54.2	51.1
Wadsworth	67.6	66.8	65.0	62.6	61.5
Wadsworth, officers	129.2	125.5	122.4	131.4	133.0
Mean of means (officers and Dix omitted)	65.8	59.8	59.9	61.4	60.3

TABLE 181.—*Per cent distribution of grades, by form.*

Form.	Number cases.	E	D	C−	C	C+	B	A	Below C.	Above C.
Form 5	5,357	[1] 5.5	6.9	19.7	27.9	20.6	12.4	6.9	32.1	39.9
Dix	1,209	7.0	7.4	17.7	30.2	20.8	11.3	5.7	32.1	37.8
Jackson	849	0	3.5	26.4	32.1	21.3	11.6	5.3	29.9	38.2
Sevier	890	9.7	9.9	21.1	26.7	19.0	10.0	3.6	40.7	32.6
Wadsworth	2,167	6.6	8.2	17.6	27.9	21.9	12.0	5.7	32.4	39.6
Wadsworth, officers	242	0	0	0.4	2.1	17.4	36.4	43.8	0.4	97.6
Form 6	3,231	8.4	9.0	21.7	27.3	17.5	11.1	5.4	39.1	34.0
Dix	829	10.9	10.5	20.5	25.0	18.1	10.9	4.0	41.9	33.0
Jackson	156	0	5.7	28.9	34.7	15.3	11.4	3.8	34.6	30.5
Sevier	987	16.2	14.4	24.4	25.4	12.9	5.4	1.3	55.0	19.6
Wadsworth	1,090	8.3	7.2	17.3	28.6	20.7	12.0	5.8	32.8	38.5
Wadsworth, officers	169	0	0	0	4.1	23.1	34.9	37.9	0	95.9
Form 7	3,298	7.7	8.3	22.6	27.4	17.5	10.2	6.4	38.6	34.1
Dix	562	8.2	9.9	21.1	27.0	16.8	10.2	6.9	39.2	33.9
Jackson	801	0	3.3	27.6	36.9	18.8	9.4	4.2	30.9	33.2
Sevier	1,014	16.2	13.1	25.0	23.8	13.7	6.3	1.9	54.3	21.9
Wadsworth	777	8.0	8.4	20.6	25.9	20.6	10.8	5.8	37.0	37.2
Wadsworth, officers	144	0	0	2.8	7.6	18.8	31.2	39.6	2.8	89.6
Form 8	4,333	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dix	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Jackson	917	0	4.8	28.3	32.1	19.0	10.7	4.9	33.1	34.6
Sevier	923	12.1	11.9	25.0	25.4	13.5	9.3	2.7	49.0	25.5
Wadsworth	2,161	8.1	9.0	20.8	27.6	19.9	10.3	4.3	37.9	34.5
Wadsworth, officers	332	0	0	0.3	2.7	13.6	37.0	46.4	0.3	97.0
Form 9	3,688	8.3	8.0	21.5	27.4	18.8	10.4	5.8	37.8	35.0
Dix	448	11.2	9.8	18.4	28.8	19.7	9.1	3.1	39.4	31.9
Jackson	817	0.2	3.4	26.5	32.9	21.3	11.5	4.3	30.1	37.1
Sevier	928	15.3	11.0	26.0	23.7	15.1	6.1	2.8	52.3	24.0
Wadsworth	1,286	8.2	9.2	19.6	29.1	20.0	9.8	4.2	37.0	34.0
Wadsworth, officers	209	0	0	0	1.9	13.4	35.4	49.3	0	98.1

[1] Total for each form obtained by averaging per cents for each group, officers counting one-fifth.

Examination of these tables shows that at the quartile and median points there is a fairly constant difference of 6 or 6.5 points (raw score) between the extreme forms 5 and 6, form 5 being in all cases the easier.

The figures, excluding Camp Dix to allow comparison of form 8 with the other forms, show that this form is to be placed with 7 and 9. These three forms appear to be very nearly equivalent, easier than form 6 and more difficult than form 5. The Hollerith sampling places form 9 much closer to form 6, and shows small but significant difference between 7 and 8.

It is interesting to observe that these differences in difficulty had remained similar even through the revision of examination *a* to alpha. Reference to chapter 15, section 5, Part II, will show that the evidence on examination *a* indicated that form A was significantly easier than the others, while forms B and E seemed the most difficult.

CHAPTER 4.

CAMP DIFFERENCES IN INTELLIGENCE RATINGS.

Anyone whose duties in the Army brought him into intimate contact with several camps realizes that there existed in the abilities of both officers and men camp differences of considerable magnitude. It is the purpose of this chapter to point to these differences as they appear in the results of psychological examinations.

The data of this chapter pertain to white recruits and officers and are derived from Groups I, II, III, and VIII. The first three groups are white men of the draft: Group I is composed of about 40,000 men pro-rated by States; Group II consists of about 20,000 men, supplying additional cases for the smaller States; Group III is made up of about 40,000 men selected to give additional data by camps. Group VIII is composed wholly of white officers. Tables 182 to 189, inclusive, present the distributions of these samples as they were determined by camps in the Hollerith sortings.

TABLE 182.—*Variables: Alpha score × camp. Group VIII: Officers.*

For all officers who took alpha only.

Alpha Score.	Camp.																							Total.
	Bowie.	Cody.	Devens.	Dodge.	Fremont.	Grant.	Greene.	Humeneck.	Humphries.	Jackson.	Kearney.	Lewis.	Logan.	Meade.	Pike.	Sheridan.	Sherman.	Taylor.	Travis.	Upton.	Wadsworth.	Wheeler.		
205–212			2	1		2			3			4					1		1			2		16
200–204			5	2	1	2	1	1	6	1		3		3	4	1	4				4	1		39
195–199		3	1	9		5	2	1	21	7		16		1	12	3	18	2	7		8	2		118
190–194	1	2	15	16		11	5	3	26	8		16		11	16	9	2	8	6	3	27	3		188
185–189	1	3	21	17	3	8	4	2	42	12	1	49	1	8	37	13	38	13	12	5	35	3		328
180–184	3	9	29	42	1	20	8	2	51	22	1	65	3	13	38	18	52	9	25	3	34	4		452
175–179	2	9	38	41	4	18	19	5	51	30		91	1	14	65	22	52	17	18	8	41	10		556
170–174	1	10	38	65		23	12	2	61	43		109	3	11	85	38	60	17	19	18	61	12		688
165–169	1	18	51	61	4	37	21	12	75	37	4	109	2	21	81	51	67	11	49	7	60	7		786
160–164	3	10	57	65		35	32	6	60	48		116	5	14	114	49	84	14	45	7	68	4		836
155–159	1	20	50	64	44		39	10	49	35		121	8	25	107	57	83	11	48	13	97	7		889
150–154	1	26	52	61	4	39	41	1	64	51	1	132	6	18	119	70	68	19	50	13	109	11		959
145–149	3	9	69	78	3	47	31	5	49	44	1	131	4	18	112	53	84	11	53	11	115	14		945
140–144		23	61	57	3	38	49	5	43	42	3	129	7	19	110	56	69	22	50	11	106	12		915
135–139	1	23	52	64		51	58	3	23	47	3	119	3	21	109	60	68	16	43	21	114	9		908
130–134	1	40	51	72	1	49	62	2	32	51	2	118	5	17	107	67	55	17	50	13	112	9		933
125–129		18	45	54		37	63	9	18	33	3	84	2	11	91	68	67	15	28	13	93	14		769
120–124	1	29	45	68	5	46	55	3	16	33	2	80	5	16	103	53	75	8	35	13	120	14		822
115–119	2	26	46	38	3	22	83	1	4	35	1	76	3	12	97	34	61	12	35	12	97	7		707
110–114		24	33	33	3	33	67			13		75	1	9	76	42	47	12	35	8	79	32		620
105–109		20	33	33	2	31	60			17	3	63	4	10	69	38	38	1	24	12	72	28		558
100–104		25	16	27	1	17	68			13	3	37	3	4	66	40	35	4	10	3	78	16		466
95–99	1	14	19	29	2	5	51	1		21	4	48	5	8	49	30	38	2	17	6	60	14		425
90–94		10	18	23	2	11	44			15	1	24	3	9	64	21	17	11	13	9	54	11		350
85–89		7	13	16	1	13	39		1	10		21	3	5	31	14	17	4	8	4	38	6		251
80–84		10	16	16		13	45			11		14	2	3	29	29	13	1	6	3	44	9		264
75–79	1	9	15	10		4	37			7		15	2	3	19	10	14	1	6	2	26	6		187
70–74	1	6	6	5	3	9	19			4		10	1		17	8	8		1	2	21	4		125
65–69		2	11	2	1	4	24			4		6		3	20	10	6	1	5	1	17	4		121
60–64	1	3	2	3	1	6	17			1		7	2	1	13	7	8	1	1		9	5		88
55–59		1	1	2		2	14			3		8			10	7	6	1	2		11	5		73
50–54				3	1	3	19			2		2	2	1	6	2	1		2		8	3		55
45–49		1	1	3			14			2		3	2	1	2	1	1		1		7			39
40–44		3	1			1	1					2							1	1	3			16
35–39				1		2	4			2					2	1	1				3			16
30–34				1		1	2			1		2					2			1	3			13
25–29				1			1					1			1						1	2		7
20–24	1	1		1								1												4
15–19							1														2			3
10–14																								0
5–9															1									1
Total	27	414	913	1,084	93	642	1,115	77	695	705	33	1,905	88	310	1,885	982	1,260	261	706	223	1,837	289		15,544

TABLE 183.—*Variables: Alpha score × camp. Groups I, II, III: White draft.*

For men who took alpha only.

Alpha Score.	Camp.															Total.
	Custer.	Devens.	Dix.	Dodge.	Funston.	Gordon.	Grant.	Lee.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	Wadsworth.	
205–212	.....	1	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	2	.....	.....	4
200–204	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	2	.....	3
195–199	.....	3	.....	1	.....	.....	1	.....	3	.....	.....	1	.....	7	4	20
190–194	.....	6	2	.....	5	1	1	.....	1	2	1	6	1	3	5	34
185–189	3	3	2	6	2	1	4	1	10	7	4	5	2	9	5	64
180–184	8	17	6	1	3	7	3	4	8	3	4	7	1	5	8	85
175–179	4	19	2	5	13	2	9	.....	19	1	7	7	4	11	8	111
170–174	12	29	8	8	11	6	10	1	28	7	9	21	8	16	20	194
165–169	10	35	12	4	16	8	19	1	32	10	8	26	12	19	27	239
160–164	16	43	18	11	24	11	23	6	45	11	8	30	13	25	20	304
155–159	15	57	14	9	28	14	44	4	44	13	9	41	24	25	41	382
150–154	33	63	15	27	30	12	26	7	67	13	26	35	26	30	49	459
145–149	40	80	19	26	35	18	37	9	67	17	29	53	40	35	49	554
140–144	29	97	26	17	33	25	54	12	76	25	31	65	23	36	49	598
135–139	40	89	30	25	49	27	63	10	100	25	26	70	36	57	56	703
130–134	41	101	31	35	78	30	66	13	134	34	42	88	45	65	57	860
125–129	59	115	40	38	55	36	77	19	151	28	40	106	58	70	85	977
120–124	48	121	42	48	76	46	79	27	137	44	52	92	48	79	89	1,028
115–119	73	137	66	69	83	51	94	24	197	51	73	119	65	106	106	1,314
110–114	75	169	55	80	87	47	135	34	172	49	75	143	73	113	130	1,437
105–109	99	169	58	89	124	67	129	28	211	49	76	152	84	141	144	1,620
100–104	87	185	59	114	121	52	134	43	220	66	97	155	85	136	154	1,708
95– 99	110	212	69	108	132	94	158	43	237	74	102	179	93	151	180	1,852
90– 94	118	223	68	123	152	80	192	46	274	83	133	203	101	178	198	2,172
85– 89	142	207	85	112	181	100	216	69	282	69	156	180	129	213	189	2,330
80– 84	137	225	95	142	189	112	220	67	312	86	148	240	159	203	229	2,563
75– 79	150	266	87	174	198	84	211	64	336	96	172	243	174	229	242	2,726
70– 74	173	296	108	177	214	93	271	71	317	126	199	270	163	234	264	2,976
65– 69	168	278	95	181	267	138	255	85	321	104	216	274	204	237	281	3,104
60– 64	202	317	127	165	269	141	270	100	307	115	267	318	249	293	270	3,410
55– 59	195	268	122	189	278	149	333	125	377	138	261	338	227	293	289	3,582
50– 54	200	328	140	189	285	139	295	120	344	133	291	336	210	289	317	3,616
45– 49	203	335	133	177	332	192	330	126	316	130	333	366	312	300	356	3,941
40– 44	241	359	128	153	293	180	340	149	301	135	338	368	271	315	335	3,906
35– 39	197	316	134	151	284	218	287	146	260	142	384	360	321	317	391	3,908
30– 34	220	327	120	132	276	176	289	144	237	151	432	348	341	260	341	3,794
25– 29	216	231	122	111	213	214	271	135	90	135	396	314	286	269	328	3,331
20– 24	195	151	124	60	217	187	191	133	53	119	385	282	255	126	347	2,825
15– 19	154	36	99	55	174	148	163	100	43	109	353	281	213	51	272	2,311
10– 14	25	40	73	22	16	113	91	150	16	65	86	151	51	16	32	947
5– 9	8	20	75	10	7	79	63	155	12	53	52	105	38	17	14	708
0– 4	11	16	148	2	2	37	26	59	6	26	30	57	18	7	9	454
Total	3,757	5,990	2,657	3,046	4,852	3,135	5,480	2,390	6,164	2,544	5,352	6,435	4,465	4,998	5,989	67,254

TABLE 184.—*Variables: Beta score × camp. Groups I, II, III: White draft.*

For men who took beta only, or alpha and beta.

Beta Score.	Camp.															Total.
	Custer.	Devens.	Dix.	Dodge.	Funston.	Gordon.	Grant.	Lee.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	Wadsworth.	
115–118	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	2	1	5
110–114	.....	.....	.....	.....	.....	.....	2	.....	1	.....	.....	.....	1	1	.....	5
105–109	1	1	.....	.....	1	.....	3	.....	2	.....	1	.....	8	1	3	21
100–104	1	3	2	1	2	1	5	.....	8	3	1	1	13	7	1	49
95– 99	4	7	.....	3	8	.....	20	.....	20	4	2	.....	5	6	5	84
90– 94	5	7	3	6	3	1	27	2	32	8	1	1	23	29	7	153
85– 89	10	12	8	19	13	5	44	3	57	10	1	2	34	34	9	261
80– 84	12	24	10	25	27	6	70	12	102	31	5	3	42	59	14	442
75– 79	25	38	15	46	31	15	94	13	143	24	23	7	33	87	38	632
70– 74	50	58	19	73	44	33	124	16	184	45	33	5	54	125	37	900
65– 69	59	94	30	122	63	33	163	25	217	78	55	19	72	166	50	1,246
60– 64	83	118	22	111	94	54	199	43	221	122	92	17	77	191	76	1,520
55– 59	90	144	58	132	101	61	183	46	193	120	110	22	112	195	91	1,667
50– 54	98	146	57	135	125	96	201	51	214	128	166	20	123	205	136	1,901
45– 49	90	191	46	141	130	107	175	63	181	116	185	35	117	237	167	1,981
40– 44	100	191	80	149	121	102	140	73	143	169	233	44	136	222	155	2,058
35– 39	103	180	90	116	87	127	143	80	127	126	209	50	138	233	176	1,985
30– 34	94	185	96	93	101	98	144	81	102	180	232	75	149	207	225	2,062
25– 29	79	168	97	125	91	117	125	96	39	165	206	68	172	211	246	2,005
20– 24	79	179	106	86	81	125	88	83	23	170	251	80	136	137	199	1,823
15– 19	30	81	92	38	25	85	48	125	2	175	91	66	83	100	43	1,084
10– 14	16	25	86	4	11	74	46	107	3	110	76	129	38	28	8	759
5– 9	8	23	95	.....	3	55	22	64	2	98	21	103	17	13	10	534
0– 4	5	10	81	.....	5	26	8	29	.....	70	20	82	20	8	6	370
Total	1,042	1,885	1,093	1,425	1,167	1,221	2,074	1,012	2,016	1,960	2,015	829	1,603	2,502	1,703	23,547

TABLE 185.—*Variables: Mental age on Stanford-Binet examination×camp. Groups I, II, III: White draft.*

For men who took Stanford-Binet examination only, or following alpha, following beta, or following alpha and beta.

Mental age on Stanford-Binet examination.	Camp.															Total.
	Custer.	Devens.	Dix.	Dodge.	Funston.	Gordon.	Grant.	Lee.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	Wadsworth.	
16.5–16.9												1				1
16.0–16.4						1						1				2
15.5–15.9											2					2
15.0–15.4				1							2	1				4
14.5–14.9				1					1		3					5
14.0–14.4				1				1			4			1		7
13.5–13.9											1	1				2
13.0–13.4	1			1		1		1			7	1			1	13
12.5–12.9				1		1			1		2	1				6
12.0–12.4		1		8		1		1	2		15		2	1	2	33
11.5–11.9	1			4		3	2	1	1	1	10	2		4	4	33
11.0–11.4		1		11	1	9		4	1	3	22	2	11	3	10	78
10.5–10.9	2			11	1	3	3	6	2	3	24	3	5	6	4	73
10.0–10.4	2	6	1	11		7	4	17	4	3	34	1	13	14	17	134
9.5– 9.9	5	6	2	23	6	9	4	13	6	5	24	1	17	8	18	147
9.0– 9.4	5	86	2	12	8	2	8	12	5	8	29	2	46	27	21	273
8.5– 8.9	2	13	2	5	6	5	5	16	2	4	25	10	25	26	11	157
8.0– 8.4		15	2	3	3	5	3	11	3	2	13	11	13	16	11	111
7.5– 7.9	1	4	1	3	4	3	3	5	1	1	3	15	4	1	2	51
7.0– 7.4	2	2			2	6	2	10	1	1		17	4	1	3	51
6.5– 6.9	1		5		2	5	1	4				9		1	1	29
6.0– 6.4	2					1	1			1	1	4	2		2	14
5.5– 5.9								1				2		1	1	5
5.0– 5.4		1					1	1	1			1	3		2	10
4.5– 4.9														1		1
4.0– 4.4												1				1
3.5– 3.9									1			1	1			3
Total	24	135	15	96	33	62	37	104	32	32	221	88	146	111	110	1,246

TABLE 186.—*Variables: Score on point scale examination×camp. Groups I, II, III: White draft.*

For men who took point scale examination only, or following alpha, following beta, or following alpha and beta.

Score on point scale examination.	Camp.															Total.
	Custer.	Devens.	Dix.	Dodge.	Funston.	Gordon.	Grant.	Lee.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	Wadsworth.	
100			1													1
95–99				1							2		1	1		5
90–94	1						1				1		2		2	7
85–89							2	1		2			3			8
80–84					1	2	2				6		2			13
75–79	1					1	3			2			7		1	15
70–74	3					9			1	10	8		12		15	58
65–69	1		1			3				8	6		18		14	51
60–64	1					10	2	1		10	10		27		66	127
55–59		1	2			3	2			5	12	1	37		52	115
50–54	2	2				2	5			9	4		29		60	113
45–49	1	1				5		1	1	9	1	2	26		23	70
40–44		1				5	5			3			13		21	48
35–39	1									5	1	1	5	1	18	32
30–34					1	1	1		1	2				3	1	10
25–29						2	1	1					2	1	2	9
20–24													4			4
15–19					1					1						2
10–14																0
5– 9																0
0– 4			1													1
Total	11	5	5	1	3	43	24	4	3	66	51	4	188	6	275	689

TABLE 187.—*Variables: Score on performance scale examination×camp. Groups I, II, III: White draft.*

For men who took performance scale examination only, or following alpha, following beta, or following alpha and beta.

Score on performance examination.	Camps.															
	Custer.	Devens.	Dix.	Dodge.	Funston.	Gordon.	Grant.	Lee.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	Wadsworth.	Total.
260–269													1			1
250–259	1															1
240–249																0
230–239																0
220–229	1										1					2
210–219																0
200–209		2							3						3	8
190–199	2	2				2			1					2	1	10
180–189	1	6		1					2	2			1		2	15
170–179	3	4					1		4	2	1		2		6	22
160–169	4	2				2			8	1			4		4	25
150–159	4	7				1			10	3			3	2	6	36
140–149	7	7	2			4			10	5			7	3	7	52
130–139	8	5	1			1	1		9	1	1		5	2	14	48
120–129	7	19	1			3	1		10	2		1	3	6	8	61
110–119	4	20				2	1		12	2	3		7	2	6	59
100–109	9	18	9			4	2		10	2			9	22	9	94
90– 99	4	24	1	1		4	4		9	1	1		12	18	13	92
80– 89	9	27	9			3	6		9	4		1	12	20	15	115
70– 79	13	21	4			2	8		11	1		1	15	34	12	122
60– 69	9	28	16	2	1	4	10		5	2	2		4	50	10	143
50– 59	4	17	8	1	1	5	6		10				11	39	20	122
40– 49	3	11	7	1		2	3	1	1	6	2	1	7	27	18	90
30– 39	3	5	8			2	5		2	2	1	1	4	16	5	54
20– 29	3	4	4		1	1	3	1	4				4	6	3	34
10– 19	1	3	1	1			5				1	1	1	8	3	25
0– 9			2									1		2	1	6
Total	99	232	73	7	3	42	56	2	130	36	13	7	112	259	166	1,237

TABLE 188.—*Variables: Alpha score×camp. Groups I, II, III: White draft.*

For all men who took alpha, as alpha only, alpha and beta, alpha and an individual examination, or alpha, beta, and an individual examination.

Alpha score.	Camp.															
	Custer.	Devens.	Dix.	Dodge.	Funston.	Gordon.	Grant.	Lee.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	Wadsworth.	Total.
205–212		1							1				2			4
200–204											1			2		3
195–199		3		1			1		3			1		7	4	20
190–194		6	2		5	1	1		1	2	1	6	1	3	5	34
185–189	3	3	2	6	2	1	4	1	10	7	4	5	2	9	5	64
180–184	8	17	6	1	3	7	3	4	8	3	4	7	1	5	8	85
175–179	4	19	2	5	13	2	9		19	1	7	7	4	11	8	111
170–174	12	29	8	8	11	6	10	1	28	7	9	21	8	16	20	194
165–169	10	35	12	4	16	8	19	1	32	10	8	26	12	19	27	239
160–164	16	43	18	11	24	11	23	6	45	11	8	30	13	25	20	304
155–159	15	57	14	9	28	14	44	4	45	13	9	41	24	25	41	383
150–154	33	63	15	27	30	12	26	7	67	13	26	35	26	30	49	459
145–149	40	80	19	26	35	18	37	9	67	17	29	53	40	35	49	554
140–144	29	97	26	17	33	25	54	12	76	25	31	65	23	36	50	599
135–139	40	90	30	25	49	27	63	10	100	25	26	70	36	57	56	704
130–134	41	101	31	35	78	30	66	13	135	34	42	88	45	65	57	861
125–129	59	115	40	38	55	36	77	19	152	28	40	106	59	71	85	980
120–124	48	121	42	48	76	46	79	27	138	44	52	92	48	79	89	1,029
115–119	73	137	66	69	83	51	94	24	198	51	74	119	65	106	106	1,316
110–114	75	169	56	80	87	47	135	34	173	49	75	143	73	113	130	1,439
105–109	99	170	58	89	124	67	129	28	211	49	76	152	84	142	144	1,622
100–104	87	185	59	114	121	52	135	45	221	66	98	155	86	136	156	1,716
95– 99	110	212	69	108	132	94	158	43	239	74	103	179	93	162	181	1,957
90– 94	118	223	68	123	152	81	192	46	275	83	135	203	103	178	198	2,178
85– 89	142	208	85	112	181	100	216	69	282	69	156	180	131	213	189	2,333
80– 84	137	225	95	142	189	112	220	69	314	86	148	240	161	203	228	2,569
75– 79	150	267	87	174	198	84	211	66	338	96	173	243	175	229	242	2,733
70– 74	173	297	108	177	215	93	271	75	319	126	200	270	164	234	265	2,987
65– 69	168	278	95	181	267	138	255	86	323	104	218	274	205	237	281	3,110
60– 64	203	317	127	165	269	141	272	101	319	115	269	318	251	293	270	3,430
55– 59	195	268	123	189	278	150	335	136	392	138	262	339	231	293	289	3,618
50– 54	200	329	142	190	285	139	295	124	362	133	293	337	211	289	317	3,646
45– 49	203	336	135	177	332	194	330	131	339	130	337	366	316	301	357	3,984
40– 44	241	360	128	153	293	181	340	157	313	135	341	395	277	315	336	3,965
35– 39	197	316	134	151	284	220	288	153	335	142	387	360	330	318	394	4,009
30– 34	221	327	122	135	277	176	289	148	317	151	435	356	348	271	342	3,915
25– 29	216	260	123	111	215	217	281	147	272	136	404	315	303	313	329	3,642
20– 24	195	260	136	62	218	193	222	143	232	119	399	283	312	238	347	3,359
15– 19	174	233	114	56	174	168	206	175	184	109	385	281	320	237	274	3,090
10– 14	131	200	92	25	84	170	173	168	151	76	345	151	288	201	219	2,474
5– 9	80	129	89	12	47	131	105	181	95	60	255	105	277	158	129	1,853
0– 4	36	99	161	3	14	59	42	70	42	31	120	57	140	81	91	1,046
Total	3,982	6,685	2,739	3,059	4,977	3,302	5,710	2,533	7,173	2,568	5,985	6,474	5,288	5,756	6,387	72,618

TABLE 189.—*Variables: Beta score×camp. Groups I, II, III: White draft.*

For all men who took beta, as beta only, alpha and beta only, beta with an individual examination, or alpha, beta, and an individual examination.

Beta score.	Camp.															Total.
	Custer.	Devens.	Dix.	Dodge.	Funston.	Gordon.	Grant.	Lee.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	Wadsworth.	
115-118	.....	.....	.....	1	.....	.....	.....	.....	.....	1	1	.....	.....	2	1	6
110-114	.....	.....	.....	.....	.....	.....	2	.....	1	.....	.....	.....	1	1	.....	5
105-109	1	1	.....	.....	1	.....	3	.....	2	.....	1	.....	8	1	3	21
100-104	1	3	2	1	2	1	5	.....	8	3	1	1	13	7	1	49
95- 99	4	7	.....	3	8	.....	20	.....	20	4	2	.....	5	6	5	84
90- 94	5	7	3	6	3	1	27	2	32	6	1	1	23	29	7	153
85- 89	10	12	8	19	13	5	44	3	57	10	1	2	34	34	9	261
80- 84	12	24	10	25	27	6	70	12	102	31	6	3	43	59	14	444
75- 79	25	39	15	46	31	15	94	13	144	24	25	7	33	87	38	636
70- 74	50	58	19	73	44	34	124	16	184	45	35	5	54	125	37	903
65- 69	59	94	30	122	63	33	164	25	217	78	56	19	72	166	50	1,248
60- 64	83	118	22	111	94	54	199	44	221	122	94	17	77	191	76	1,523
55- 59	90	146	58	132	101	61	185	47	193	129	112	22	113	195	91	1,675
50- 54	99	146	57	135	125	97	201	52	214	128	169	20	123	205	136	1,907
45- 49	91	191	46	141	130	107	175	64	181	116	187	35	117	237	167	1,985
40- 44	100	192	80	149	121	102	142	76	143	169	238	44	137	222	156	2,071
35- 39	103	150	90	116	87	128	143	84	128	126	214	51	138	233	178	2,000
30- 34	94	185	97	91	101	98	144	81	121	181	233	75	151	268	226	2,086
25- 29	79	169	98	125	91	119	126	103	75	165	212	68	174	213	247	2,064
20- 24	85	194	107	95	83	126	88	84	51	175	264	80	154	158	228	1,972
15- 19	56	139	106	67	27	109	76	136	34	195	179	66	163	172	167	1,692
10- 14	41	109	107	41	16	94	70	126	13	149	155	130	156	148	146	1,501
5- 9	32	83	121	22	8	72	40	86	7	121	57	104	86	106	108	1,053
0- 4	16	56	103	4	7	38	21	38	2	89	38	84	71	50	56	675
Total	1,136	2,153	1,179	1,525	1,183	1,301	2,163	1,092	2,150	2,067	2,281	834	1,946	2,855	2,147	26,012

TABLE 190.—*Percentages of final grades made on each type of examination.*

Type of examination.	Camp.															Total.
	Custer.	Devens.	Dix.	Dodge.	Funston.	Gordon.	Grant.	Lee.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	Wadsworth.	
Alpha only	76.4	72.8	68.8	66.4	80.0	69.4	71.4	68.1	74.0	54.8	69.9	87.5	68.6	63.4	72.5	71.8
Beta only and alpha beta only	21.0	22.8	26.4	31.3	19.3	27.3	27.0	29.0	24.1	42.3	26.3	11.2	24.6	31.8	20.9	24.7
Performance	2.0	2.8	1.9	0.2	0.1	0.9	0.7	0.1	1.6	0.8	0.2	0.1	1.7	3.3	2.0	1.4
Point scale	0.2	0.1	0.1	0	0.1	0.9	0.3	0.1	0	1.4	0.7	0	2.9	0.1	3.2	0.7
Stanford-Binet	0.5	1.6	0.4	2.1	0.5	1.4	0.5	2.9	0.4	0.7	2.9	1.2	2.2	1.4	1.3	1.4
All individuals	2.7	4.5	2.4	2.3	0.7	3.2	1.5	3.1	2.0	2.9	3.8	1.3	6.8	4.8	6.5	3.5
Number of cases	4,933	8,247	3,843	4,575	6,058	4,503	7,671	3,512	8,345	4,638	7,652	7,363	6,514	7,876	8,243	93,973

Because there were great differences in procedure employed in the psychological work at the various camps there is some question as to the reliability of the comparisons that can be made on the basis of the figures available. A phase of these differences is shown in table 190, which presents the percentages of final grades made on each type of examination in the various camps. At Camp Taylor 87.5 per cent of the men examined took alpha only, while in Camp Meade the percentage of men taking alpha only was 54.8. There is also a wide range of difference in the men who were graded on the basis of the beta examination; i. e., the men who took beta only or a combination of alpha and beta only. In Camp Taylor 11.2 per cent of the men received their final grades on the basis of beta scores, while in Camp Upton 31.8 per cent of the men were graded by beta. In the case of the individual examinations we find further differences; 6.8 per cent of the men were given individual examinations at Camp Travis, while only 0.7 per cent were given individual examinations at Camp Lee. At Camp Upton 70 per cent of the men who took individual examination were given the performance scale, 30 per cent the Stanford-Binet examination. At Camp Funston, on the other hand, only 15 per cent were tested on the performance scale, while 70 per cent were given the Stanford-Binet, and the remaining 15 per cent the point scale. On this basis it is clear that unless all types of examinations were standardized so that the letter grades given on them mean approximately the same

thing, some of the differences between camps may be explained by these varying percentages of men who took the different examinations.

Another source of inaccuracy may have been in the selecting of the cards for the various groups. If there was any factor of selection working when the cards were chosen it would be possible to get results which did not picture the camps as they actually were. A rough index of the validity of the selections is furnished by a comparison of Groups I, II, and III as a whole. If these large groups give comparable results, selection is more likely to have been free from gross prejudicial factors. Table 191 gives the percentage distribution of the alpha scores of

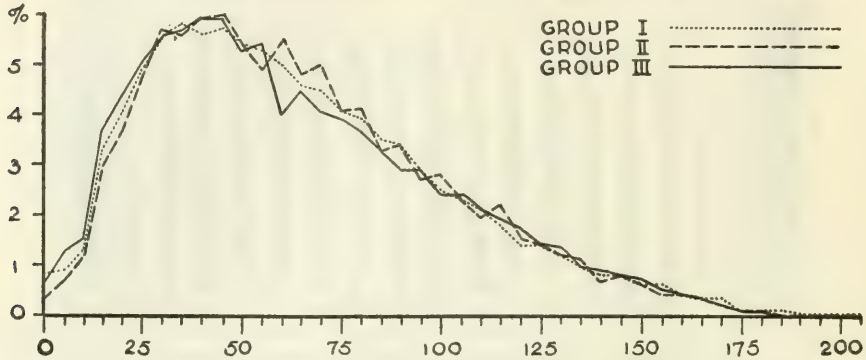

FIG. 10.—Percentage distribution of the alpha scores of men in Groups I, II, and III who were graded on the basis of alpha.

the men in Groups I, II, and III who took alpha only and these same data are presented diagrammatically in figure 10. Both the table and the figure show that the differences between the groups are not great. In table 192 there is presented a percentage distribution of beta scores of men in Groups I, II, and III who took beta only or alpha and beta only. Figure 11 presents the facts shown in table 192. In this case there is a slight difference in the groups between the scores of 15 and 45. Groups I and II differ rather widely through this interval,

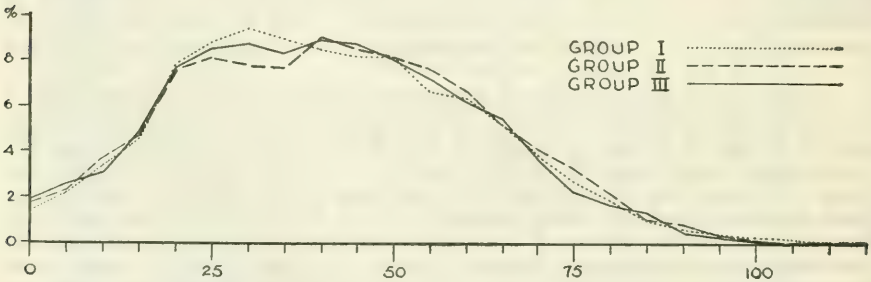

FIG. 11.—Percentage distribution of beta scores of men in Groups I, II, and III who were graded on the basis of beta.

while Group III falls practically between them. However, when the facts are considered in the light of the letter grades this difference practically disappears. Probably the chief difference between the three groups lies in the fact that in Group II a larger number of the men were graded on the basis of beta than was the case in the other two groups, where the percentages of men who were graded on the basis of alpha and the men who were graded on the basis of beta were about equal. The percentage of men in each group who received final grades on the basis of each examination is shown in table 193.

TABLE 191.—*Percentage distribution of alpha scores of men in Groups I. II, and III who took alpha only.* (*Cf. fig. 10.*)

Alpha score.	Group I.	Group II.	Group III.
205–212	0.01	0.01	0
200–204	.01	.01	0
195–199	.05	.02	.01
190–194	.05	.03	.06
185–189	.10	.09	.09
180–184	.11	.15	.13
175–179	.18	.16	.15
170–174	.33	.25	.26
165–169	.38	.30	.35
160–164	.48	.44	.43
155–159	.64	.46	.52
150–154	.66	.62	.73
145–149	.84	.81	.81
140–144	.86	.75	.97
135–139	1.06	1.11	1.00
130–134	1.26	1.24	1.30
125–129	1.47	1.44	1.43
120–124	1.46	1.50	1.82
115–119	1.84	2.26	1.97
110–114	2.16	2.08	2.14
105–109	2.36	2.39	2.46
100–104	2.54	2.82	2.44
95– 99	2.90	2.77	2.96
90– 94	3.40	3.40	2.98
85– 89	3.58	3.38	3.38
80– 84	3.91	4.13	3.70
75– 79	4.12	4.17	3.96
70– 74	4.52	5.01	4.12
65– 69	4.65	4.84	4.51
60– 64	5.04	5.56	4.00
55– 59	5.36	4.94	5.42
50– 54	5.40	5.47	5.32
45– 49	5.75	6.08	5.90
40– 44	5.66	5.92	5.92
35– 39	5.86	5.69	5.79
30– 34	5.63	5.79	5.61
25– 29	4.95	4.78	5.03
20– 24	4.12	3.76	4.45
15– 19	3.34	3.01	3.72
10– 14	1.32	1.20	1.58
5– 9	.92	.73	1.32
0– 4	.83	.36	.62
Total	30,670	9,921	28,663

TABLE 192.—*Percentage distribution of beta scores of men in Groups I, II, and III, who took beta only or alpha and beta only.* (*Cf. fig. 11.*)

Beta score.	Group I.	Group II.	Group III.
115–118	0.03	0.05	[illegible]
110–114	.03	.02	.01
105–109	.11	.12	.05
100–104	.25	.26	.14
95– 99	.37	.33	.36
90– 94	.69	.82	.53
85– 89	1.03	1.08	1.22
80– 84	1.97	2.20	1.65
75– 79	2.74	3.30	2.36
70– 74	3.85	4.05	3.72
65– 69	5.28	5.25	5.35
60– 64	6.38	7.05	6.30
55– 59	6.72	7.70	7.21
50– 54	8.14	8.12	8.04
45– 49	8.19	8.46	8.66
40– 44	8.45	9.05	8.98
35– 39	8.88	7.70	8.34
30– 34	9.32	7.75	8.66
25– 29	8.80	8.05	8.50
20– 24	7.87	7.51	7.75
15– 19	4.50	4.52	4.76
10– 14	3.30	3.24	3.16
5– 9	2.11	2.14	2.52
0– 4	1.26	1.68	1.87
Total	10,027	4,296	9,224

TABLE 193.—*Percentage of men in each group who received final grades on the basis of each examination.*

Type of examination.	Group I.	Group II.	Group III.	Total.
Alpha	73.10	67.8	71.1	71.8
Beta	23.90	29.4	24.5	24.7
Performance	1.2	1.2	1.6	1.4
Point scale	0.5	0.6	1.5	.7
Stanford-Binet	1.0	1.2	1.7	1.4
All individuals	2.7	3.0	4.8	3.5
Number of cases	41,803	14,693	37,507	93,973

Table 194.—*Percentage distribution by group for three selected camps of the alpha scores of men who took alpha only.*

Alpha score.	Dix.				Dodge.				Lee.			
	Group I.	Group II.	Group III.	Total.	Group I.	Group II.	Group III.	Total.	Group I.	Group II.	Group III.	Total.
205-212	0	.....	0	.....	0	0	0	.....	0	0	0	.....
200-204	0	.....	0	.....	0	0	0	.....	0	0	0	.....
195-199	0	.....	0	.....	0	0	.1	0.03	0	0	0	.....
190-194	0	.....	.1	0.1	0	0	0	.....	0	0	0	.....
185-189	.1	.....	.1	.1	.2	.2	.2	.2	0	0	.1	0.04
180-184	.3	.....	.2	.2	0	0	.1	.03	0	0	.2	.16
175-179	0	.....	.1	.1	.2	.1	.2	.16	0	0	0	.....
170-174	.4	.....	.2	.3	.4	0	.4	.2	.3	0	0	.04
165-169	.4	.....	.5	.4	0	.2	.1	.1	0	0	.1	.04
160-164	.6	.....	.7	.7	.4	.2	.4	.4	.3	0	.3	.25
155-159	.6	.....	.5	.5	.2	.1	.4	.3	.3	.7	.1	.16
150-154	.8	.....	.4	.5	.2	.6	1.2	.9	.8	0	.2	.29
145-149	.5	.....	.8	.7	1.3	.6	.8	.9	1.0	.7	.2	.38
140-144	.5	.....	1.2	.9	.4	.9	.5	.5	.5	.7	.5	.5
135-139	.7	.....	1.4	1.1	.9	.6	.9	.8	1.0	0	.3	.4
130-134	1.5	.....	1.2	1.2	1.3	.9	1.2	1.1	1.0	0	.5	.54
125-129	1.6	.....	1.5	1.5	1.5	1.5	1.1	1.2	1.0	.7	.8	.8
120-124	1.2	.....	1.8	1.6	.9	1.7	1.7	1.6	1.8	.7	1.0	1.1
115-119	1.5	.....	3.1	2.6	2.6	2.8	1.9	2.2	1.6	.7	.9	1.0
110-114	2.1	.....	2.1	2.1	2.6	1.7	3.1	2.6	3.1	2.1	1.0	1.4
105-109	1.6	.....	2.5	2.2	3.5	2.5	3.0	2.9	2.1	.7	1.0	1.1
100-104	1.6	25.0	2.5	2.3	3.0	5.3	3.3	3.8	2.1	3.6	1.6	1.8
95- 99	2.3	.....	2.8	2.7	3.5	3.6	3.6	3.5	2.1	1.4	1.8	1.8
90- 94	1.3	25.0	3.2	2.6	4.3	4.6	3.7	4.1	1.6	2.1	2.0	1.9
85- 89	2.6	.....	3.5	3.3	4.4	3.1	3.8	3.7	5.8	1.4	2.4	2.9
80- 84	3.8	.....	3.5	3.7	5.0	4.2	4.8	4.7	4.5	2.1	2.5	2.8
75- 79	2.8	.....	3.5	3.3	4.3	9.0	4.6	5.7	3.7	2.9	2.5	2.7
70- 74	2.6	.....	4.9	3.8	6.7	4.9	6.0	5.8	4.5	2.9	2.7	3.0
65- 69	2.3	.....	4.3	3.6	6.7	6.3	5.5	5.9	5.2	5.0	3.1	3.6
60- 64	4.7	.....	4.8	4.8	3.7	7.2	5.1	5.4	4.2	3.6	4.2	4.2
55- 59	5.3	.....	4.2	4.6	5.9	5.3	6.8	6.2	5.2	4.3	5.3	5.2
50- 54	4.7	.....	5.6	5.3	5.9	6.6	6.1	6.2	6.8	6.5	4.6	5.0
45- 49	5.3	.....	4.9	5.0	4.6	6.0	6.1	5.8	5.0	4.3	5.4	5.3
40- 44	3.9	.....	5.4	4.8	4.3	4.8	5.4	5.0	5.0	9.4	6.3	6.3
35- 39	4.6	.....	5.3	5.1	6.1	4.6	4.8	4.9	6.3	2.9	6.3	6.1
30- 34	4.1	.....	4.8	4.5	5.4	3.2	4.6	4.3	4.4	5.8	6.4	6.0
25- 29	4.6	25.0	4.5	4.6	3.5	2.8	4.1	3.6	3.4	5.0	5.6	5.7
20- 24	5.6	.....	4.2	4.7	2.7	1.6	1.9	1.9	6.0	5.0	5.5	5.6
15- 19	4.0	.....	3.6	3.7	2.7	1.8	1.5	1.8	4.7	8.6	6.9	6.7
10- 14	3.4	.....	2.4	2.7	.7	.6	.8	.7	2.9	7.2	6.9	6.3
5- 9	3.9	.....	2.2	2.8	.4	0	.5	.3	1.8	6.5	7.4	6.5
0- 4	12.8	25.0	2.0	5.7	0	0	.1	.1	.5	2.2	2.9	2.0
Total	954	4	1,699	2,657	542	819	1,685	3,046	384	139	1,867	2,390

Still greater questions as to the reliability of the figures arise when the score distributions in the three groups are studied by camps. In table 194 there is shown a percentage distribution by groups for three selected camps of the alpha scores of the men who took alpha only and therefore received their final rating on the basis of alpha. These distributions are also shown in figures 12, 13, and 14. In the case of Camp Dix the number of cases in the second group is so small that that group had no effect on the whole distribution. The differences between Groups I and III are very large at the lower end of the scale particularly, for in Group I 12.8 per cent of the men made scores ranging from 0 to 4, while in Group III no men at all fell in this group. In the case of Camp Dodge the distributions for the three groups are not widely divergent except in one or two of the score intervals. At Camp Lee, however, we again find rather wide differences. Table 195 shows percentage distributions by groups for three selected camps of the men who took beta only or alpha and beta only. These distributions are also shown in figures 15, 16, and 17. Here again there are rather wide group differences. The differences are especially noticeable in Camp Lee between Groups I and III. There is no way of telling in these cases where the distributions of the groups differ widely which distribution, if any, is typical of the camp at the time when the cards were drawn. It is, of course, more likely that the combination of the three groups presents a reliable picture but there is no way of determining with any degree of certainty whether or not this is so. These facts should be held in mind when the comparison of the camps is made.

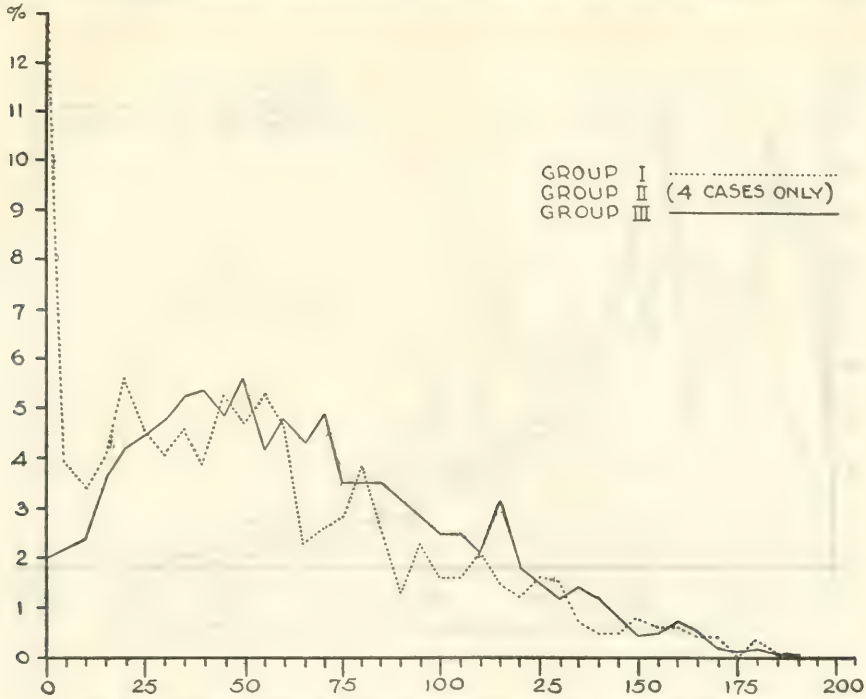

FIG. 12.—Percentage distribution of the alpha scores of Camp Dix men in Groups I, II, and III who took alpha only.

Fig. 13.—Percentage distribution of alpha scores of Camp Dodge men in groups I, II, and III who took alpha only.

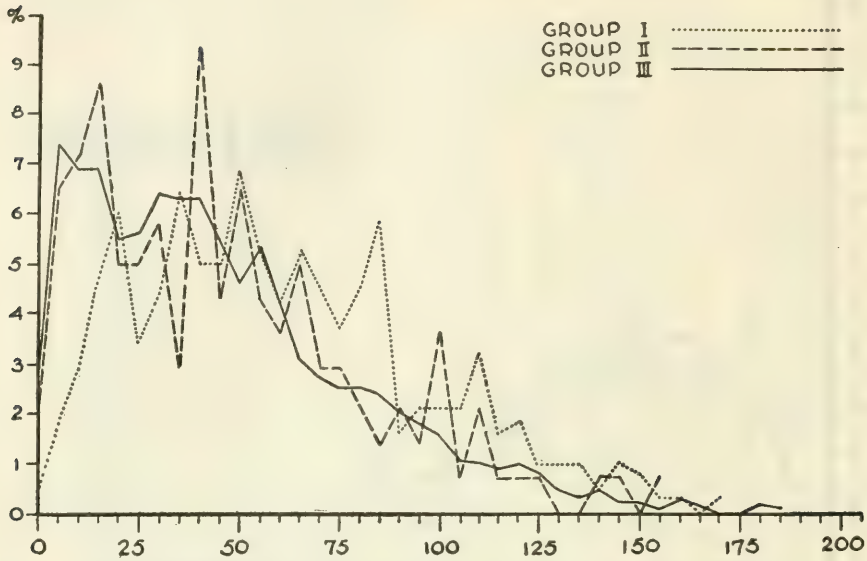

FIG. 14.—Percentage distribution of alpha scores of Camp Lee men in Groups I, II, and III who took alpha only.

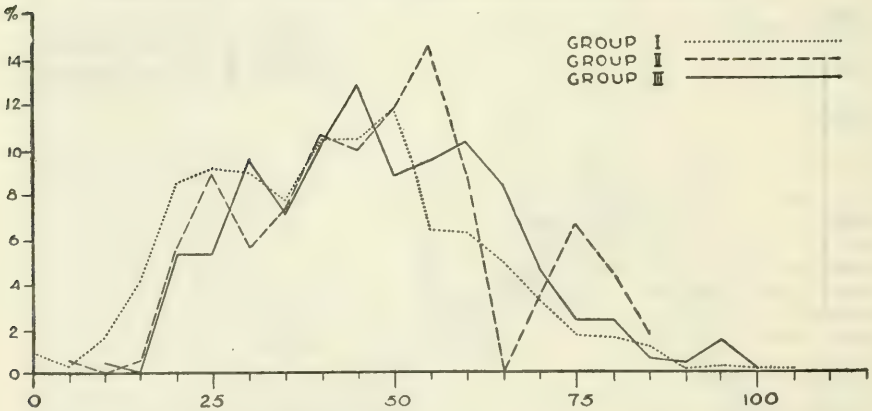

FIG. 15.—Percentage distribution of beta scores of Camp Funston men of Groups I, II, and III who were graded on the basis of beta.

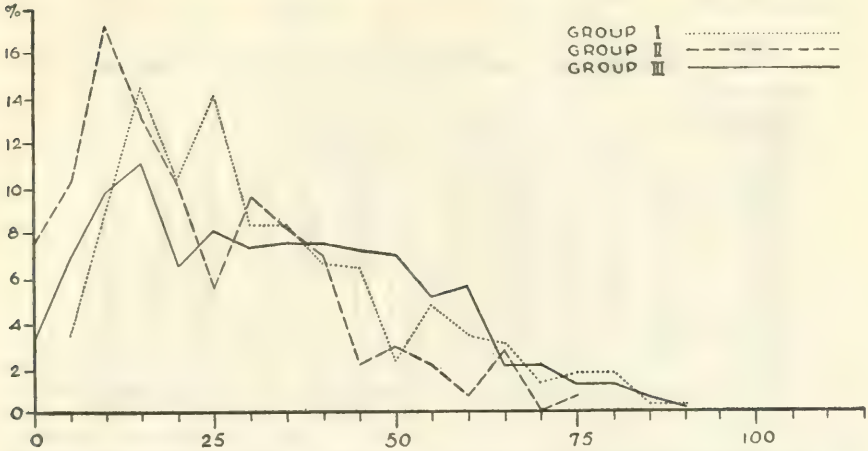

FIG. 16.—Percentage distribution of beta scores of Camp Lee men in Groups I, II, and III who were graded on the basis of beta.

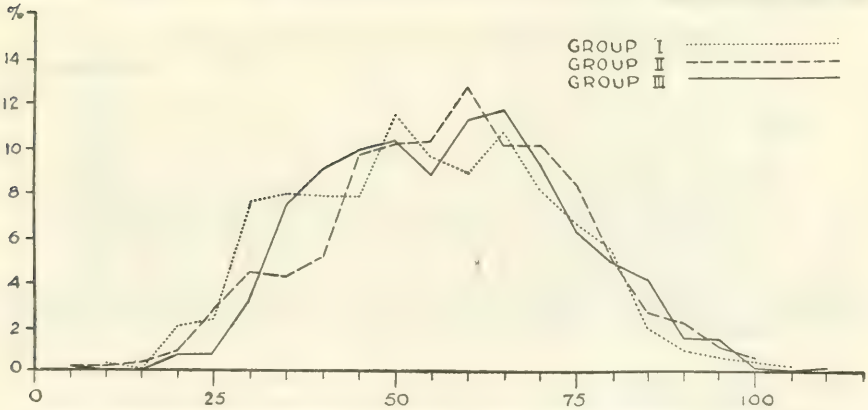

FIG. 17.—Percentage distribution of beta scores of Camp Lewis men of Groups I, II, and III who were graded on the basis of beta.

TABLE 195.—*Percentage distribution by groups for three selected camps of the beta scores of men who took beta only or alpha and beta only.*

Beta score.	Funston.				Lee.				Lewis.			
	Group I.	Group II.	Group III.	Total.	Group I.	Group II.	Group III.	Total.	Group I.	Group II.	Group III.	Total.
115-118	0	.....	0	.....	.....	.....	.....	.....	0	0	0	.....
110-114	0	.....	0	.....	.....	.....	.....	.....	0	0	0.1	0.05
105-109	0.2	.....	0	0.09	.....	.....	.....	.....	0.3	0	0	.1
100-104	.2	.....	0.2	.2	.....	.....	.....	.....	.4	0.5	0.1	.4
95- 99	.3	.....	1.5	.7	.....	.....	.....	.....	.6	1.1	1.4	1.0
90- 94	.2	.....	.5	.3	0.3	.....	0.2	0.2	.9	2.1	1.4	1.7
85- 89	1.2	1.7	.7	1.1	.3	.....	.5	.3	2.0	2.6	4.1	2.8
80- 84	1.6	4.5	2.4	2.3	1.7	.....	1.2	1.2	5.4	5.0	4.8	4.9
75- 79	1.7	6.7	2.4	2.7	1.7	0.7	1.2	1.3	6.5	8.3	6.2	7.0
70- 74	3.3	3.4	4.7	3.8	1.3	0	2.1	1.6	8.1	10.1	9.1	9.1
65- 69	5.0	0	8.3	5.4	3.0	2.8	2.1	2.5	10.7	10.1	11.7	10.8
60- 64	6.2	8.9	10.2	8.1	3.4	.7	5.6	4.3	8.8	12.7	11.2	11.0
55- 59	6.4	14.5	9.3	8.6	4.7	2.1	5.1	4.5	9.6	10.2	8.7	9.6
50- 54	11.7	11.7	8.8	10.7	2.3	2.8	7.0	5.1	11.5	10.1	10.3	10.6
45- 49	10.4	10.0	12.8	11.3	6.4	2.1	7.2	6.2	7.7	9.6	9.8	9.0
40- 44	10.4	10.6	10.3	10.4	6.7	6.9	7.6	7.3	7.7	5.0	8.9	7.1
35- 39	7.8	7.3	7.1	7.0	8.4	8.3	7.6	7.8	7.8	4.2	7.3	6.3
30- 34	9.0	5.6	9.5	8.6	8.4	9.6	7.4	7.9	7.5	4.3	3.0	4.9
25- 29	9.1	8.9	5.4	7.8	14.1	5.5	8.1	9.5	2.2	2.6	.7	1.9
20- 24	8.5	5.6	5.4	6.9	10.4	10.3	6.5	8.2	1.9	.8	.7	1.2
15- 19	4.2	.6	0	2.2	14.4	13.1	11.1	12.4	0	.3	0	.1
10- 14	1.6	0	.5	.9	9.0	17.2	9.7	10.1	.3	.1	0	.1
5- 9	.3	.6	0	.3	3.4	10.3	6.9	6.3	0	.1	.1	.1
0- 4	.9	0	0	.4	0	7.6	3.2	2.8	0	.....	0	.....
Total	579	179	409	1,167	298	145	569	1,012	691	763	562	2,016

As the officers were not tested in all of the camps and as the selection of cards for this study was made with no reference to this point, there are not data on officers from all the camps where the psychological work was carried on. It was found that there were sufficient cases from seventeen camps and table 196 shows the distribution of intelligence ratings in these camps. In table 197 the camps are arranged in order of their rank according to the percentage of A and B grades which were made by the officers of each camp. This table also includes the percentage of A grades made at each camp and some figures which were obtained in previous studies of the same sort.

TABLE 196.—*Intelligence rating by camp, 15,000 white officers (Group VIII).*

Rating.	Camp.																	
	Cody.	Devens.	Dodge.	Grant.	Greenleaf.	Humphreys.	Jackson.	Lewis.	Meade.	Pike.	Sheridan.	Sherman.	Taylor.	Travis.	Upton.	Wadsworth.	Wheeler.	Combined.
A	40.4	59.0	59.2	52.0	29.0	89.5	60.5	63.1	63.6	53.6	51.2	59.6	65.3	60.2	53.5	47.9	34.7	55.0
B	38.4	27.6	27.4	33.4	35.1	10.1	25.7	25.9	24.3	29.0	30.8	27.4	25.0	29.5	31.8	31.2	35.8	28.4
C+	17.8	10.7	11.2	9.7	25.5	.1	10.9	8.3	10.4	13.6	14.7	10.5	8.8	8.3	12.0	16.1	21.4	12.5
C	3.1	2.3	1.8	3.7	9.7	0	2.3	1.9	1.9	3.6	3.5	1.9	1.2	1.6	1.4	3.9	7.2	3.3
C−	.7	.1	.3	.7	1.1	0	.4	.4	0	.2	.1	.3	0	.1	1.0	.6	.7	.3
D	.2	0	.1	0	.1	0	0	.1	0	0	0	0	0	0	0	.1	0	0
D−	0	0	0	0	0	0	0	0	0	.1	0	0	0	0	0	0	0	0
Number of cases	413	913	1,084	642	1,115	695	705	1,905	310	1,885	982	1,260	261	706	223	1,837	290	.....

TABLE 197.—*Rank of camps by intelligence ratings of officers.*

Per cent A grade.	Camp.	Per cent A and B grades.	Previous figures per cent A and B grades.
89.0	Humphreys	99.6	97.8
65.3	Taylor	90.0	.....
60.2	Travis	89.7	.....
63.1	Lewis	89.0	.....
63.6	Meade	87.9	91.9
59.6	Sherman	87.0	92.0
59.2	Dodge	86.6	87.0
59.0	Devens	85.6	.....
60.5	Jackson	86.2	81.6
52.0	Grant	85.4	.....
53.5	Upton	85.3	.....
53.6	Pike	83.6	82.0
51.2	Sheridan	82.0	79.8
47.0	Wadsworth	79.1	78.0
40.4	Cody	78.8	.....
34.7	Wheeler	70.5	.....
29.0	Greenleaf	64.1	.....
55.0	All combined	83.4	83.0

It is clearly shown in the tables that there is considerable difference in the ratings for the officers at the different camps. At Humphreys practically all the officers scored B or better, while at Greenleaf only 64 per cent of them got into the upper classes.

In the light of other data on the differences in intelligence ratings according to the different branches of the service the possibility is at once evident that these figures may be repeating the comparison of the branches of the service. To determine this point table 198 was prepared. This table shows the percentage of officers in the various branches of the service at the different

TABLE 198.—*Percentage of officers in the various branches of the service at different camps.*

Camp.	Branch of service.								
	Engineers.	Artillery.	Chaplain.	Sanitary Corps.	Field signal battalion	Machine gun battalion.	Infantry.	Quartermaster Corps.	Medical Corps.
Humphreys	100	.....	.....	.....	.....	.....	.....	.....	.....
Taylor	.....	.....	100	.....	.....	.....	.....	.....	.....
Travis	8.4	24.2	.....	.....	.4	5.4	61.6	.....	.....
Lewis	3.1	20.7	1.2	.....	1.3	1.9	50.6	3.2	18.0
Meade	.....	.....	.....	.....	51.6	.....	48.4	.....	.....
Sherman	.....	3.8	1.0	.....	.....	1.7	65.0	3.8	24.8
Dodge	.....	.....	.....	.....	1.6	5.3	66.2	4.4	22.3
Devens	6.0	.....	1.7	.....	2.3	1.7	54.5	5.7	28.1
Jackson	.....	73.0	.....	.....	2.6	.....	.....	13.2	11.3
Grant	.....	.....	.....	.....	.....	.....	44.6	7.4	47.0
Upton	.....	.....	.....	.....	.....	.5	.....	6.7	92.9
Pike	3.7	8.8	.....	.....	1.5	3.5	62.3	2.3	17.9
Sheridan	.....	19.9	1.3	.....	3.2	3.1	41.5	11.0	20.2
Wadsworth	.....	3.3	.....	.....	1.3	4.4	68.0	5.4	17.8
Cody	11.2	.....	.....	2.8	.....	16.0	70.2	.....	.....
Wheeler	.....	.....	.....	.....	.....	.....	.....	26.2	73.8
Greenleaf	.....	.....	.....	.....	.....	.....	.....	.....	100

camps. Both the camps and the arms of the service are arranged in the rank order of the percentage of A and B ratings which the officers made in them, so that it is possible to see the relationship of these two factors by an inspection of the tables. Ideally the highest percentages should lie upon a diagonal from the upper left-hand corner of the table to the lower right-hand corner. It is evident from the tables that there is some relationship. The high positions of Camps Humphreys and Taylor are probably due to the fact that the officers from these camps which were chosen for this study were men from the arms which make the best scores. At the other end of the scale are Wheeler and Greenleaf, and the officers from these camps all come from the arms which make the lowest scores. On the other hand, Jackson, with a large percentage of officers from the Artillery, which stands second in rank in the arms of the service, falls halfway down the list of camps; and Cody, with no officers at all from the lowest ranking arms, also stands low. These latter facts make it appear that there were differences in the

mental caliber of the officers at the various camps, though it is impossible to say on the basis of the data now available how great these differences were or how much they affected the work of training the men.

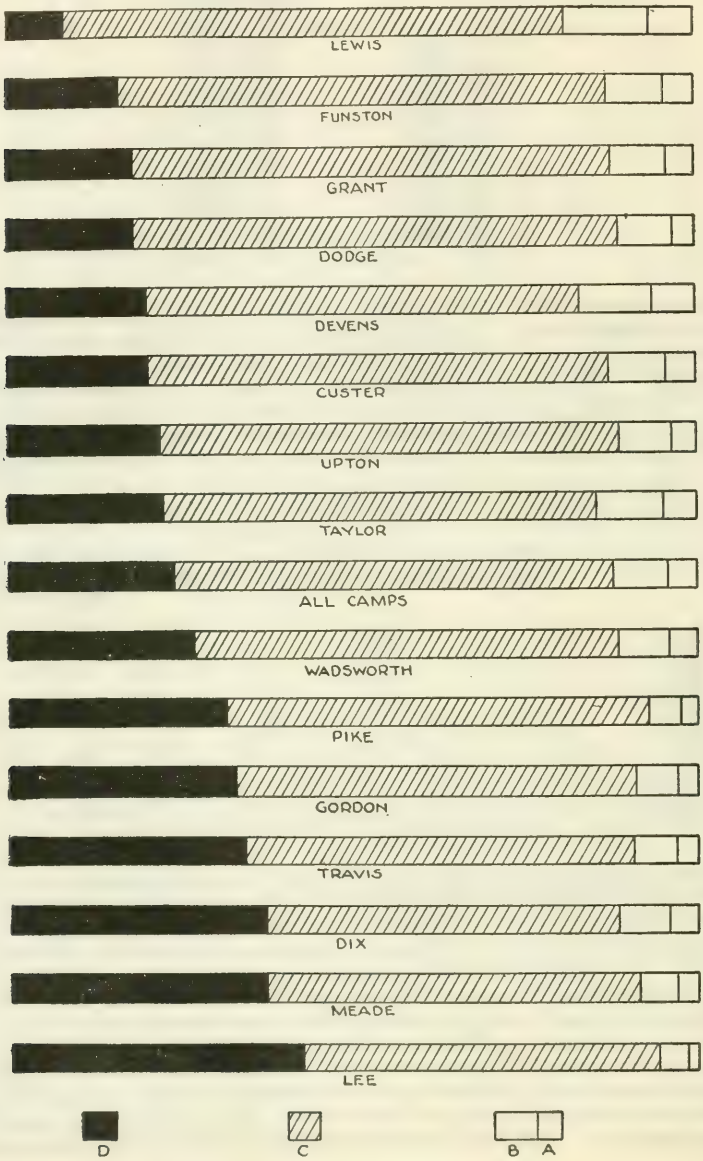

FIG. 18.—Percentage distribution of letter grades for individual camps.

In table 199 will be found the percentages of final letter grades made on all examinations by enlisted men of the 15 camps used in this study. Figure 18 presents the same data shown in table 199, with the camps arranged in the rank order of the percentage of men scoring better than D. The percentage of men scoring D, D−, or E ranges from only 8.4 per cent in Camp Lewis to 42.7 per cent in Camp Lee. There is a range in the percentage of A grades from 1.6 per cent in Camp Lee to 6.1 per cent in Camps Lewis and Devens. Considering A and B grades combined there is a range from 5.8 per cent in Camp Lee to 18.7 per cent in Camp Lewis. There is not always a perfect agreement between the percentage of low grades and the percentage of high grades. Camp Devens, for instance, is fifth on the basis of grades better than D, but would stand second if the camps were arranged in the rank order of A and B grades combined.

TABLE 199.—*Percentage of final letter grades made on all examinations, Groups I, II, III.*

Letter grade.	Camp.															Total.
	Custer.	Devens.	Dix	Dodge.	Funston.	Gordon.	Grant.	Lee.	Lewis	Meade.	Pike	Taylor.	Travis.	Upton.	Wadsworth.	
A	4.3	6.6	4.1	3.1	4.2	3.0	4.0	1.6	6.1	3.0	2.7	5.0	3.3	3.7	4.2	4.1
B	8.2	10.1	7.7	8.0	8.5	6.2	8.2	4.2	12.6	5.7	4.6	9.5	6.2	7.6	7.6	8.0
Total A and B	12.5	16.7	11.8	11.1	12.7	9.2	12.2	5.8	18.7	8.7	7.3	14.5	9.5	11.3	11.8	12.1
C+	15.5	16.5	12.5	17.9	16.7	11.8	16.3	9.8	21.9	11.1	10.6	16.4	12.6	15.4	14.7	15.0
C	26.0	24.4	20.5	29.0	29.4	20.7	27.8	19.5	30.2	19.3	22.1	26.3	23.5	25.7	23.2	25.0
C−	25.6	22.6	17.9	23.9	25.1	25.2	25.5	22.4	20.8	23.4	28.2	20.2	20.3	25.5	23.3	23.8
D	17.4	14.6	18.6	16.0	14.5	21.2	13.2	21.2	7.2	23.2	25.7	12.0	26.2	16.3	21.8	17.1
D−	3.2	5.5	18.7	2.3	1.6	11.8	5.0	21.5	1.2	14.2	6.1	10.6	8.2	5.8	5.2	7.0
Total D and D−	20.6	20.1	37.3	18.3	16.1	33.0	18.2	42.7	8.4	37.4	31.8	22.6	34.4	22.1	27.0	24.1
Number of cases	4,933	8,247	3,843	4,575	6,058	4,503	7,671	3,512	8,345	4,638	7,652	7,363	6,514	7,876	8,243	93,973

The fact that camp differences of such large magnitude have been found, together with the fact that men were sent to the camps largely on a geographical basis, suggests that there probably are more or less marked differences in the levels of intelligence in different parts of the country. Because it has been shown, however, in the early part of this chapter that the reliability of these data can not be unequivocally demonstrated, it is not safe or wise to make such geographic comparison on the data which are at present available.

CHAPTER 5.

INTELLIGENCE RATINGS BY STATES.

In the original plan for statistical analysis records were selected by States in order that a geographical picture of the country with respect to intelligence as it occurred in the draft might ultimately be achieved. Much effort was spent in obtaining cards on this basis, and the separation of the records composing Group II was accomplished entirely with the purpose of making the samples from the smaller States large enough for satisfactory statistical use. The resulting data are presented herewith in tables 200 to 206.

Unfortunately, it has not been feasible to treat these data statistically under the conditions existent during the preparation of the present report (cf. chap. 1, sect. 4), and it is necessary therefore to be satisfied with the mere presentation of the original distributions as they resulted from Hollerith analysis and to leave interpretation for future research.

It has been shown in the chapter on the comparison of camps (chap. 4) that there are decided differences from one camp to another and that these differences may depend to an unknown amount on differences in camp procedure or on other conditions that are not matters of actual intelligence of the men examined. In general, the staff feared to come to hasty conclusions upon the comparison of States with data of which the precision was so greatly affected by camp differences. On the other hand, as has been pointed out, many of these discrepancies between camps may be due to real differences of intelligence that in turn depend upon the different sections of the country from which the camps drew. It is quite possible, then, that a comparison of camps is in part a geographical comparison. The study of the distribution of intelligence by residential section in the United States is of prime importance and should be made as soon as feasible. Its very importance, however, made its undertaking seem unwise with the limited time and statistical assistance available in the office of the Section of Psychology. The comparison could undoubtedly best be made in terms of the theoretical combined scale outlined in chapter 2. It will be recalled that this scale was not available until too late in the preparation of the report for more than a few casual applications to some of the fundamental distributions.

It is to be hoped that a statistical treatment based on the data here published in tables 200 to 203 can be undertaken and that the geographical picture of intelligence can thus finally be made out. The application of the theoretical combined scale referred to above affords a ready method for comparison. Enough data are, however, presumably given for a combination on any principle of regression that the statistician may desire. It is probable that results of great importance would be obtained simply by grouping States from various sections of the country together. Such a procedure would give larger samples and by involving several camps (in general, all recruits for one State were selected from a single camp) do away to a large extent with the variable conditions resulting from the departure of individual camps from normal procedure. It may also be true that results of great interest could be obtained by selecting particular States or small groups of States from typically different parts of the country and making an extensive comparison of these groups. By proper selection it might be possible to leave camps from which the data are of doubtful validity out of account.

Tables 200 to 206 are all for white recruits. They include foreign-born cases. Tables of distribution of foreign-born recruits by States have been prepared and are on file in the office of the Surgeon General. By subtraction from the tables given here distributions of native white recruits would be obtained. Limitations of time and clerical personnel have prevented this work, but it is possible that these additional tables could be obtained for the purposes of future research.

TABLE 200.—*Variables: Alpha × State. Groups I and II: White draft.*
For men who took alpha only.

Alpha score.	Alabama.	Arizona.	Arkansas.	California.	Colorado.	Connecticut.	Delaware.	District of Columbia.	Florida.	Georgia.	Idaho.	Illinois.	Indiana.	Iowa.	Kansas.	Kentucky.	Louisiana.
205-212					1												
200-204														1			
195-199				1													
190-194						1		1		1		1			3		
185-189	1			1	1			1				3	1	3			
180-184	1					1	2		1	1	2	3		2		1	
175-179				4	1	1				1	3	4		5	4	2	
170-174	2			4	3	2		1	1		3	3	1	2	2	1	1
165-169				5	4	4	2				3	6	1	4	1		1
160-164	1			8	4	6	1	4		1	4	7	8	4	5		1
155-159			1	7	13	5		1	1	1	4	20		5	4	3	1
150-154	7			11	5	10				1	5	10	3	11	4	1	3
145-149	2		1	10	11	5	1		1	6	5	20	4	14	2	5	2
140-144	4		1	12	6	13	1	3			8	22	12	5	5	5	4
135-139	4		1	10	19	15	1	1	2	6	16	19	5	10	7	1	1
130-134	5		1	16	13	14	1	1		5	17	34	8	13	15	3	6
125-129	6		3	17	19	18		2		7	18	32	17	14	9	5	1
120-124	8		1	22	10	11	4	3	1	8	12	32	12	15	16	7	6
115-119	7		4	34	13	27	1	2		9	25	33	21	20	15	6	8
110-114	11		6	21	19	15	1	4		8	27	56	27	22	14	9	7
105-109	5		5	23	18	27			2	10	25	46	26	26	17	8	7
100-104	6		9	34	21	15	6	2		6	21	58	30	27	23	12	16
95- 99	15		13	43	23	35	3	5	3	18	29	66	31	27	20	20	7
90- 94	15		11	57	23	31	2	3	1	16	31	82	39	39	27	20	12
85- 89	19		18	30	17	44	1	2		14	23	80	25	37	32	18	16
80- 84	14		19	38	30	31	4	2		9	41	78	44	42	39	13	13
75- 79	21		20	45	27	48	3	2	2	20	44	83	50	35	36	15	26
70- 74	29		19	50	22	42	5	3	1	17	44	115	59	53	49	30	23
65- 69	27		24	45	30	32	5	3	3	31	32	89	52	47	57	32	27
60- 64	36		29	33	34	40	6	4	4	27	52	103	64	58	46	41	33
55- 59	37		26	49	25	36	6	5	4	24	45	120	63	51	44	44	28
50- 54	36		39	52	30	30	4	5	2	35	47	111	87	53	47	36	30
45- 49	39		38	35	45	41	7	4	1	49	42	116	67	58	54	43	42
40- 44	43		29	40	30	38	7	5	3	40	35	111	71	52	47	50	36
35- 39	53		40	38	36	51	4	1	4	68	36	93	76	49	56	51	47
30- 34	66		60	43	19	37	8	1	2	54	30	103	76	57	41	54	59
25- 29	43		53	4	33	32	3	1	3	66	10	96	73	49	29	59	55
20- 24	46		60	2	23	11	5	1	3	42	8	52	68	34	34	61	48
15- 19	48		50	5	22	5	10			40	7	54	52	31	31	63	31
10- 14	16		24	1		3	5	1	1	32	1	43		2	1	51	20
5- 9	15		10		1	2	6	1		21	4	31	1	2	1	40	14
0- 4	9		3	1		4	8	2	1	11	1	21				22	9
Total	697	0	618	851	651	783	126	77	47	702	760	2,056	1,169	979	840	832	641

Alpha score.	Maine.	Maryland.	Massachusetts.	Michigan.	Minnesota.	Mississippi.	Missouri.	Montana.	Nebraska.	Nevada.	New Hampshire.	New Jersey.	New Mexico.	New York.	North Carolina.	North Dakota.	Ohio.
205-212			1														
200-204														1			
195-199			2											7			1
190-194			1											2			2
185-189				1				3				2		5			3
180-184	3		3	3			1				1	3		3		2	2
175-179	1		5				4	2			1		1	7		1	1
170-174	4	2	7	3	1	1	5		2	1	1	4		8		3	13
165-169	5	2	5	3	2	1	2	1	4		1	4		13			14
160-164	5	2	8	5	5	1	5	3	4	1	3	4		16		4	17
155-159	8	2	13	4	6		7	1	1		5	6		18	2	3	21
150-154	7	2	12	13	3		5	4	2	1	3	8	1	18	2	5	19
145-149	5	5	23	9	7		9	9	3		2	6	1	21	3	4	28
140-144	11	6	16	6	9	2	7	3	6		10	4	2	19	2	5	32
135-139	5	4	20	15	9	2	12	5	5		8	6	2	35	4	8	44
130-134	4	3	27	11	9	1	20	5	9		12	10	2	33	3	11	44
125-129	14	6	22	17	13	4	14	10	10	2	7	15	2	46	2	9	56
120-124	13	7	18	14	8	3	17	9	10	3	20	10	2	50	1	9	39
115-119	14	6	26	20	15	8	22	25	12	1	12	13	6	58	6	10	43
110-114	10	8	30	24	14	5	20	10	18	1	39	20	1	54	6	12	65
105-109	18	14	24	33	19	5	28	18	21	5	15	16	1	81	9	22	70
100-104	11	15	39	25	19	5	34	21	19	8	36	15	4	87	9	21	56
95- 99	25	16	46	36	15	10	23	24	24	2	20	21	4	75	14	15	60
90- 94	27	24	42	32	25	9	33	33	28	2	32	11	5	114	15	29	89
85- 89	17	17	46	46	26	18	49	28	21	2	8	21	9	127	11	28	74
80- 84	24	16	45	39	34	18	56	29	32		35	33	7	109	18	26	93
75- 79	35	26	47	44	35	11	54	26	32	4	12	25	10	125	21	26	106
70- 74	43	36	56	61	33	22	51	33	43	4	27	21	9	143	33	35	101
65- 69	37	29	68	64	43	29	54	47	41	5	17	19	10	129	15	32	103
60- 64	34	30	63	57	47	35	74	42	37	12	44	39	13	180	21	40	103
55- 59	40	32	41	55	46	25	77	39	36	9	20	46	12	165	23	37	120
50- 54	25	36	59	63	36	39	66	47	39	5	69	45	4	178	31	32	114
45- 49	47	34	64	50	50	46	78	31	43	6	19	43	9	155	35	61	124
40- 44	38	28	59	67	35	43	64	33	29	3	65	35	12	184	47	46	135
35- 39	37	32	60	55	41	64	70	27	44	2	18	44	9	191	49	44	105
30- 34	33	38	50	54	39	59	80	20	35	2	72	34	17	143	40	47	113
25- 29	35	34	41	64	39	71	67	17	25		14	42	12	151	58	41	84
20- 24	15	34	24	52	20	42	66	13	15	1	39	48	6	63	66	39	63
15- 19	5	30	7	37	4	45	53	11	19	1	6	31	11	12	54	48	79
10- 14	7	16	5	8	8	22		4	5		10	28		7	2	5	40
5- 9		8	6		3	10			2		4	32		7	4	2	24
0- 4	2	6	3	5	1	9					3	114		3	1	2	9
Total	664	606	1,134	1,095	719	665	1,227	632	676	81	710	878	184	2,843	607	764	2,318

TABLE 200.—*Variable: Alpha × State. Groups I and II: White draft*—Continued.

Alpha score.	Oklahoma.	Oregon.	Pennsylvania.	Rhode Island.	South Carolina.	South Dakota.	Tennessee.	Texas.	Utah.	Vermont.	Virginia.	Washington.	West Virginia.	Wisconsin.	Wyoming.	Total.
205–212				1												3
200–204																2
195–199		1	3							1					1	17
190–194		1	2			1				1						17
185–189		4	2	1		1		1		1		2		1		38
180–184		1	4			1			1	3		3	1			49
175–179	1	2	7			1			1	5		4		1	1	71
170–174	2		13	2		2	3	3		6	1	4		4	4	125
165–169	1	3	15	2		6	2	4	4	5		7	2	5	1	145
160–164		4	14	3	2	8		4	3	7	1	6		4	3	190
155–159	1	9	26			4	3	3	6	6	2	6	1	8	5	243
150–154	3	12	26	2	3	3	1	3	5	9	3	13	6	4	1	270
145–149	8	13	29	3	1	6	1	6	7	15	4	10	3	5	4	342
140–144	2	9	28	2	2	4	5	4	5	10	3	10	2	10	2	339
135–139	4	14	25	12	4	9	2	3	5	5	4	23	3	15	8	435
130–134	3	19	37	6		8	10	15	12	9	4	15	3	5	9	511
125–129	10	17	51	5	3	11	2	7	12	11	5	25	3	9	7	595
120–124	6	15	55	8	5	13	8	12	14	10	8	14	4	14	8	595
115–119	8	24	59	17	7	11	9	17	11	30	7	24	11	22	20	789
110–114	12	25	74	11	4	11	11	12	15	32	15	16	11	27	16	876
105–109	14	25	78	17	8	15	12	18	19	21	13	30	7	24	14	959
100–104	16	29	92	12	13	20	16	18	20	32	13	27	11	20	20	1,066
95– 99	14	27	106	21	9	16	13	31	18	21	10	25	10	26	19	1,163
90– 94	18	36	115	26	14	11	20	21	21	29	9	32	12	33	22	1,378
85– 89	24	33	116	28	14	28	20	33	34	24	24	51	15	34	28	1,430
80– 84	25	51	136	30	15	25	27	35	30	33	20	43	13	38	25	1,575
75– 79	19	43	142	41	14	30	17	54	33	34	17	43	10	36	22	1,671
70– 74	22	39	136	38	19	39	12	49	44	29	21	36	18	41	22	1,880
65– 69	29	47	156	37	24	42	25	47	35	43	27	40	18	37	19	1,904
60– 64	43	29	147	47	21	32	25	71	27	38	22	36	21	41	25	2,106
55– 59	39	46	158	37	34	43	29	68	39	32	26	53	26	49	29	2,138
50– 54	39	37	158	24	31	50	28	57	35	39	25	43	23	46	22	2,159
45– 49	46	33	169	49	44	55	46	90	33	41	24	41	26	65	26	2,364
40– 44	45	22	179	36	35	51	41	74	39	53	32	37	20	70	22	2,316
35– 39	54	25	182	39	49	42	43	87	37	60	20	32	21	58	18	2,363
30– 34	53	31	160	33	38	45	40	105	24	47	24	24	27	51	10	2,298
25– 29	49	9	135	40	37	36	51	77	9	43	20	6	25	41	8	1,990
20– 24	47	4	130	26	47	41	50	62	1	18	30	1	22	44	7	1,634
15– 19	24	4	94	28	36	24	13	53	2	3	30	4	21	48	2	1,288
10– 14	4	4	16	2	7	2	31	14	1	3	20	2	11	36	3	523
5– 9	2	3	8	3			26	9		3	16	5	4	25	1	356
0– 4	1		6	1			12	4			5	1	5		2	287
Total	688	750	3,089	600	540	747	654	1,169	602	802	505	794	416	997	455	40,530

TABLE 201.—*Variables: Beta score × State. Groups I and II: White draft.*

For men who took beta only, or alpha and beta only.

Beta score.	Alabama.	Arizona.	Arkansas.	California.	Colorado.	Connecticut.	Delaware.	District of Columbia.	Florida.	Georgia.	Idaho.	Illinois.	Indiana.	Iowa.	Kansas.	Kentucky.	Louisiana.
115–118																	
110–114												1					
105–109				2	2									1			
100–104				2	1	1				1		4					
95– 99			1	1	1						1	8			1		2
90– 94				2	2						10	13		1			
85– 89				6	2					1	7	13	2				
80– 84				20	5	1				2	9	26	1	1	4	1	2
75– 79	3		4	10	3	2				5	22	20	4	4	4		3
70– 74	4		3	32	7					4	22	43	1	11	6	2	3
65– 69	6		3	33	7	5		3	1	5	27	44	8	9	12		9
60– 64	16		16	24	4	5	1	5	1	16	34	68	4	13	11	2	24
55– 59	9		15	24	6	5	1	3		19	24	64	9	14	12		23
50– 54	20		23	48	9	10	2	2		25	28	76	7	16	24	2	29
45– 49	19		37	29	8	14	2	4	1	24	18	57	13	14	14		19
40– 44	30		30	32	5	15	2	4	1	24	17	47	17	18	16	6	37
35– 39	31		42	34	12	23	2	4	1	29	7	52	6	15	11	2	30
30– 34	37	1	36	38	5	24	1	2	2	24	10	53	19	8	10	22	28
25– 29	43		36	8	6	15		2	1	28	5	55	15	10	14		35
20– 24	32		45	12	8	21	2	1	1	20	3	42	12	7	8	28	45
15– 19	35		22		4	22	1	1	1	24		22	13	3	2		23
10– 14	42		14	1	2	1	2	2		22		30	7	1	1	51	19
5– 9	29		4		1		1	3		17		12	8	1	1	40	3
0– 4	28		2							4		3	4	1		28	8
Total	384	1	333	358	100	164	17	36	10	294	244	753	150	148	151	187	342

TABLE 201.—*Variables: Beta score × State. Groups I and II. White draft*—Continued.

Beta score.	Maine.	Maryland.	Massachusetts.	Michigan.	Minnesota.	Mississippi.	Missouri.	Montana.	Nebraska.	Nevada.	New Hampshire.	New Jersey.	New Mexico.	New York.	North Carolina.	North Dakota.	Ohio.
115–118	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....
110–114	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1	2	.....	.....	.....
105–109	.....	1	.....	.....	3	.....	1	.....	.....	.....	.....	.....	2	.....	.....	.....	.....
100–104	.....	1	2	1	1	.....	1	.....	.....	.....	.....	2	4	4	.....	.....	.....
95– 99	.....	.....	1	1	7	.....	.....	2	1	.....	1	.....	.....	6	.....	1	.....
90– 94	1	1	2	1	8	.....	.....	2	1	1	.....	1	6	17	.....	1	.....
85– 89	2	2	2	2	14	.....	4	5	5	1	4	1	6	20	.....	2	.....
80– 84	4	6	2	3	22	1	3	9	4	3	8	3	14	39	1	3	1
75– 79	[illegible]	7	7	7	37	.....	4	16	5	2	5	3	4	59	.....	9	2
70– 74	18	9	8	13	36	5	8	18	14	3	4	4	10	71	.....	14	1
65– 69	18	11	14	16	48	3	11	24	28	4	22	6	10	109	5	12	3
60– 64	17	29	24	28	28	[illegible]	15	34	25	4	27	6	12	111	10	23	5
55– 59	33	26	20	15	30	11	19	28	35	3	20	16	19	109	11	24	3
50– 54	21	30	30	22	28	27	37	27	44	1	23	27	24	101	14	33	3
45– 49	30	21	40	29	27	7	40	40	37	2	22	18	15	144	20	30	3
40– 44	29	32	29	26	21	36	39	35	33	.....	25	30	29	130	25	19	3
35– 39	21	28	34	34	21	22	33	31	26	2	19	32	27	139	35	22	11
30– 34	24	36	50	37	19	41	37	13	20	1	18	38	32	127	41	13	6
25– 29	20	33	39	28	14	23	42	40	24	1	17	39	31	116	57	10	7
20– 24	15	34	60	25	2	49	40	29	23	1	18	42	18	75	47	17	6
15– 19	10	33	18	[illegible]	3	11	21	11	3	.....	3	34	20	63	6	2	6
10– 14	4	20	8	[illegible]	3	18	8	2	.....	.....	4	32	10	19	1	1	2
5– 9	1	21	10	3	.....	7	2	.....	.....	.....	4	32	3	5	1	.....	2
0– 4	.....	10	3	4	1	4	.....	.....	.....	.....	27	.....	4	6	1	.....	[illegible]
Total	276	391	403	312	374	273	365	366	328	29	271	366	301	1,474	275	236	68

Beta score.	Oklahoma.	Oregon.	Pennsylvania.	Rhode Island.	South Carolina.	South Dakota.	Tennessee.	Texas.	Utah.	Vermont.	Virginia.	Washington.	West Virginia.	Wisconsin.	Wyoming.	Total.
115–118	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	4
110–114	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
105–109	1	.....	1	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	16
100–104	.....	2	1	.....	.....	.....	.....	1	1	.....	4	2	.....	.....	.....	36
95– 99	1	[illegible]	2	.....	.....	1	.....	2	1	.....	.....	3	.....	1	2	50
90– 94	5	2	5	1	[illegible]	1	.....	5	2	3	.....	4	.....	1	.....	100
85– 89	2	7	5	1	2	6	.....	3	3	1	.....	9	2	4	1	147
80– 84	3	12	3	5	6	10	.....	7	14	2	.....	9	6	3	8	286
75– 79	4	20	17	7	12	13	2	9	21	3	1	20	4	5	13	410
70– 74	5	24	18	10	8	11	6	13	24	7	.....	15	19	7	13	554
65– 69	11	27	22	23	10	19	6	6	25	10	4	23	23	7	12	744
60– 64	11	24	28	22	11	26	16	24	34	[illegible]	1	21	25	15	15	931
55– 59	26	28	33	21	20	32	18	25	22	18	3	26	40	10	15	987
50– 54	23	23	45	21	33	28	26	32	26	13	4	23	29	8	7	1,154
45– 49	18	20	45	25	36	24	31	33	22	27	3	21	29	16	13	1,161
40– 44	24	14	38	29	39	24	27	36	12	27	10	13	58	15	4	1,212
35– 39	30	8	46	31	37	14	38	36	15	16	12	15	32	15	4	1,187
30– 34	24	11	73	18	45	14	24	39	11	15	14	12	49	21	5	1,246
25– 29	31	7	65	24	48	12	22	42	7	19	11	6	54	19	1	1,182
20– 24	15	1	47	17	35	11	31	35	2	9	15	4	59	12	.....	1,081
15– 19	12	.....	7	8	18	2	24	16	.....	6	19	1	45	18	1	602
10– 14	4	[illegible]	3	.....	4	.....	17	5	.....	[illegible]	25	.....	28	10	.....	442
5– 9	1	.....	2	2	6	.....	19	4	.....	1	15	1	19	9	.....	290
0– 4	4	.....	2	2	3	.....	2	6	.....	.....	11	.....	17	1	.....	190
Total	255	235	509	267	376	248	309	379	242	188	152	228	538	199	114	14,019

TABLE 202.—*Variables: Score on performance scale examination × State. Groups I and II: White draft.*

For men who took the performance scale examination only, or following alpha, or following beta, or following alpha and beta.

Score on performance scale examination.	Alabama.	Arizona.	Arkansas.	California.	Colorado.	Connecticut.	Delaware.	District of Columbia.	Florida.	Georgia.	Idaho.	Illinois.	Indiana.	Iowa.	Kansas.	Kentucky.	Louisiana.
300																	
290–299																	
280–289																	
270–279																	
260–269																	
250–259																	
240–249																	
230–239																	
220–229														1			
210–219						1											
200–209																	
190–199																	
180–189						1											
170–179																	
160–169				2													
150–159				3													
140–149											1						
130–139				2		1											
120–129				2		3						1					
110–119			1	3		3					2		1				
100–109				2		5											
90– 99				4		6						1					
80– 89				1		6	1					1					
70– 79				5		8											
60– 69						4	1								1		1
50– 59				1		2											
40– 49												1				1	1
30– 39												1		2			
20– 29						1						1		1			
10– 19			1													1	
0– 9																1	
Total	0	0	2	25	0	41	2	0	0	0	3	6	1	4	1	3	2

Score on performance scale examination.	Maine.	Maryland.	Massachusetts.	Michigan.	Minnesota.	Mississippi.	Missouri.	Montana.	Nebraska.	Nevada.	New Hampshire.	New Jersey.	New Mexico.	New York.	North Carolina.	North Dakota.	Ohio.
300																	
290–299																	
280–289																	
270–279																	
260–269																	
250–259																	
240–249																	
230–239																	
220–229				1													
210–219																	
200–209											1						
190–199																	
180–189	1									1	1						
170–179											1		1				
160–169															1		
150–159	1		2	2						1	1		3				
140–149	2		1	2									2	1	1		
130–139				2		1					1		3	1	2		
120–129	7			3							2		1	2	5		1
110–119	1		3	1		1					1		3	1	3		
100–109	1		1	5							2		5	10	2		
90– 99	2		1	2		1					3		6	9	4		
80– 89	1		1	3							4		4	11	2		
70– 79	1		1	6	1						1		5	22	3		
60– 69	3		2	1							3		2	29	2		
50– 59	3		3	3							1		7	22	3		
40– 49			3	2									4	15	2		
30– 39	1			3	1								3	9	2		
20– 29													2	3	1		
10– 19											1		1	6	1		
0– 9														1	1		
Total	24	0	18	36	2	3	0	0	0	2	23	0	52	142	35	0	1

TABLE 202.—*Variables: Score on performance scale examination × State. Groups I and II: White draft*—Continued.

Score on performance scale examination.	Oklahoma.	Oregon.	Pennsylvania.	Rhode Island.	South Carolina.	South Dakota.	Tennessee.	Texas.	Utah.	Vermont.	Virginia.	Washington.	West Virginia.	Wisconsin.	Wyoming.	Total.
300																
290–299																
280–289																
270–279																
260–269																
250–259																
240–249																
230–239																
220–229																2
210–219																1
200–209			3													4
190–199			2							1						3
180–189	1		1	1												7
170–179			3		2								1			8
160–169			2		1							1	1			8
150–159		1	5	1					2	2		2	1			27
140–149		1	3	2	1			4	1	2		2				26
130–139	1		6	1	1				2	1						25
120–129			1				1	2	1							32
110–119				1	1			1	1	2			1			31
100–109			5	6	1			1	3	2		1				52
90– 99			1	6	4			5		1		2			2	60
80– 89	2		2	1	6			2	2	2		1	1	1		55
70– 79		1	3	5	2		1	8		1		1	1	1		77
60– 69			1	8	5			2	2	4						71
50– 59		1	8	2	5			1	1	4		3				70
40– 49				4	2			1	1	1						38
30– 39					2				1							25
20– 29				3												12
10– 19				1												12
0– 9																3
Total	4	4	46	42	33	0	2	27	17	23	0	13	6	2	2	649

TABLE 203.—*Variables: Score on point scale examination × State. Groups I and II: White draft.*

For men who took the point scale examination only, or following alpha, or following beta, or following alpha and beta.

Score on point scale examination.	Alabama.	Arizona.	Arkansas.	California.	Colorado.	Connecticut.	Delaware.	District of Columbia.	Florida.	Georgia.	Idaho.	Illinois.	Indiana.	Iowa.	Kansas.	Kentucky.	Louisiana.
100																	
95– 99			2														
90– 94			2														
85– 89														1			
80– 84															1		
75– 79																	
70– 74			1		1									1			
65– 69	1													3			1
60– 64			3		2												
55– 59			2		4								1				
50– 54			2		1												
45– 49			1		2											1	
40– 44										1							
35– 39														1		1	
30– 34															1		
25– 29										1							
20– 24					1												
15– 19																	
10– 14																	
5– 9																	
0– 4																	
Total	1	0	13	0	11	0	0	0	0	2	0	0	1	6	2	2	1

TABLE 203.—*Variables: Score on point scale examination × State. Groups I and II: White draft*—Continued.

Score on point scale examination.	Maine.	Maryland.	Massachusetts.	Michigan.	Minnesota.	Mississippi.	Missouri.	Montana.	Nebraska.	Nevada.	New Hampshire.	New Jersey.	New Mexico.	New York.	North Carolina.	North Dakota.	Ohio.
100																	
95– 99														1			
90– 94			1														
85– 89																	
80– 84						1											
75– 79											1					1	
70– 74						1							1		3		
65– 69															3		
60– 64											3				12	1	
55– 59	1														19		
50– 54	1										1				7		
45– 49											1				3		
40– 44		1									1		1		3		
35– 39															6		
30– 34		1								1					3		
25– 29		1									1				2		
20– 24											1	2					
15– 19							1										
10– 14																	
5– 9																	
0– 4																	
Total	2	3	1	0	0	2	1	0	0	1	9	2	2	1	61	2	0

Score on point scale examination.	Oklahoma.	Oregon.	Pennsylvania.	Rhode Island.	South Carolina.	South Dakota.	Tennessee.	Texas.	Utah.	Vermont.	Virginia.	Washington.	West Virginia.	Wisconsin.	Wyoming.	Total.
100																
95– 99																3
90– 94			1					1								5
85– 89								2					1			4
80– 84	1							1					2			6
75– 79								2					3			7
70– 74	2		1		4			3					3			21
65– 69	2		2		4			3					3			22
60– 64	3		9		6			5					3			47
55– 59	9		5		3			6					3			53
50– 54	4		4		4		1	11					5			41
45– 49	5		7		1			9		1			2		1	34
40– 44	3		4		2		1			1			1			19
35– 39	3		2				1									14
30– 34							1									7
25– 29	1															6
20– 24																4
15– 19																1
10– 14																
5– 9																
0– 4																
Total	33	0	35	0	24	0	4	43	0	2	0	0	26	0	1	294

TABLE 204.—*Variables: Mental age on Stanford-Binet examination* × *State. Groups* I *and* II*: White draft.*

For men who took the Stanford-Binet examination only, or following beta, or following alpha, or following alpha and beta.

Mental age on Stanford-Binet examination.	Alabama.	Arizona.	Arkansas.	California.	Colorado.	Connecticut.	Delaware.	District of Columbia.	Florida.	Georgia.	Idaho.	Illinois.	Indiana.	Iowa.	Kansas.	Kentucky.	Louisiana.
17.5–17.9																	
17.0–17.4																	
16.5–16.9													1				
16.0–16.4																	
15.5–15.9																	
15.0–15.4																	
14.5–14.9																	
14.0–14.4																	
13.5–13.9																	
13.0–13.4																	
12.5–12.9										1							
12.0–12.4	1																
11.5–11.9			2	1													
11.0–11.4			3		1									1	1		
10.5–10.9			1									1		2			
10.0–10.4	2		6		1	1	1		1				1				
9.5– 9.9	5		4		2				1			1			1		1
9.0– 9.4	7		2	1		10						3	1		2		1
8.5– 8.9	2		7			3						2	3	1		1	5
8.0– 8.4	6		1			1						3	1		2	1	4
7.5– 7.9	1		2			1						2	6			1	3
7.0– 7.4			4							1	1	1	9			2	
6.5– 6.9												1	5			1	
6.0– 6.4					1							1	1				
5.5– 5.9																1	
5.0– 5.4																	
4.5– 4.9																	
4.0– 4.4													1				
3.5– 3.9																	
3.0– 3.4																	
2.5– 2.9																	
Total	24	0	32	2	5	16	1	0	2	2	1	15	29	4	6	7	14

Mental age on Stanford-Binet examination.	Maine.	Maryland.	Massachusetts.	Michigan.	Minnesota.	Mississippi.	Missouri.	Montana.	Nebraska.	Nevada.	New Hampshire.	New Jersey.	New Mexico.	New York.	North Carolina.	North Dakota.	Ohio.
17.5–17.9																	
17.0–17.4																	
16.5–16.9																	
16.0–16.4																	
15.5–15.9						2											
15.0–15.4						2				1							
14.5–14.9						3											
14.0–14.4																	
13.5–13.9																	
13.0–13.4						2											
12.5–12.9						1											
12.0–12.4						3					1				1		
11.5–11.9						3									1		
11.0–11.4		1	1			1							3		3		
10.5–10.9						7	1						2	3		1	
10.0–10.4	1		1			2					1			7	5		
9.5– 9.9	1		1		1	5			1		1	1	3	4	2		
9.0– 9.4	6		3	1		12	4				8		10	13	4		
8.5– 8.9	8		1	1		2	3				2		6	15	4	1	1
8.0– 8.4	3		1		1	2	1				3		3	8	2		1
7.5– 7.9	1						3						1	1			2
7.0– 7.4	1				1		1				1				3		
6.5– 6.9	1						1					1					
6.0– 6.4	1														1		1
5.5– 5.9																	
5.0– 5.4	1												1		1		
4.5– 4.9																	
4.0– 4.4																	
3.5– 3.9													1				
3.0– 3.4																	
2.5– 2.9																	
Total	24	1	8	2	3	47	14	0	1	1	17	2	30	51	27	2	5

TABLE 204.—*Variables: Mental age on Stanford-Binet examination × State. Groups I and II: White draft*—Continued.

Mental age on Stanford-Binet examination.	Oklahoma.	Oregon.	Pennsylvania.	Rhode Island.	South Carolina.	South Dakota.	Tennessee.	Texas.	Utah.	Vermont.	Virginia.	Washington.	West Virginia.	Wisconsin.	Wyoming.	Total.
17.5–17.9																
17.0–17.4																
16.5–16.9																1
16.0–16.4																
15.5–15.9																2
15.0–15.4																3
14.5–14.9																3
14.0–14.4					1											1
13.5–13.9																
13.0–13.4																2
12.5–12.9																2
12.0–12.4		1							1							8
11.5–11.9				2	1									1		11
11.0–11.4	2		2	2				2					1			24
10.5–10.9			1	2	2		1	1				1	1	2	1	30
10.0–10.4	1	2	3		6			5					2	2		51
9.5– 9.9	2		5	1	3		2	1			2		2	2	2	57
9.0– 9.4	3		2	4	1			13	1	7	1		3	3	6	132
8.5– 8.9	3		2	2				11		2	2		2	2		94
8.0– 8.4			3	4	1			4		2	3		1		3	65
7.5– 7.9								2		1	1		1		2	31
7.0– 7.4							1	3			1			1		31
6.5– 6.9								1								11
6.0– 6.4								1								7
5.5– 5.9																1
5.0– 5.4		1														4
4.5– 4.9					1											1
4.0– 4.4																1
3.5– 3.9																1
3.0– 3.4																
2.5– 2.9																
Total	11	4	18	17	16	0	4	44	2	12	10	1	13	13	14	574

TABLE 205.—*Variables: Alpha × State. Groups I and II: White draft.*

For men who took alpha only, or who took alpha and beta, or alpha and an individual examination, or alpha, beta, and an individual examination.

Alpha score.	Alabama.	Arizona.	Arkansas.	California.	Colorado.	Connecticut.	Delaware.	District of Columbia.	Florida.	Georgia.	Idaho.	Illinois.	Indiana.	Iowa.	Kansas.	Kentucky.	Louisiana.
205–212					1												
200–204														1			
195–199				1													
190–194						1		1		1		1			3		
185–189	1			1	1			1				3	1	3			
180–184	1					1	2		1	1		3		2		1	
175–179				4	1	1				1	3	4		5	4	2	
170–174	2			4	3	2		1	1		3	3	1	2	2	2	1
165–169				5	4	4	2				3	6	1	4	1		1
160–164	1			8	4	6	1	4		1	4	7	3	4	5		1
155–159			1	7	13	5		1	1	1	4	20		5	4	3	1
150–154	7			11	5	10				1	5	10	3	11	4	1	3
145–149	2		1	10	11	5	1		1	6	5	20	4	14	5	5	2
140–144	4		1	12	6	13	1	3			8	22	12	5	5	5	4
135–139	4		1	10	19	15	1	1	2	3	16	19	5	10	7	1	1
130–134	5		1	16	13	14	1	1		5	17	34	8	13	15	3	6
125–129	6		3	17	19	18		2		7	18	32	17	14	9	5	1
120–124	8		1	22	10	11	4	3	1	8	12	32	12	15	16	7	6
115–119	7		4	34	13	27	1	2		9	25	33	21	20	15	6	8
110–114	11		6	21	19	15	1	4		8	27	56	27	22	14	9	8
105–109	5		5	23	18	27			2	10	25	46	26	26	17	8	7
100–104	6		9	34	21	15	6	2		6	21	58	30	27	23	12	16
95– 99	15		13	43	23	35	3	5	3	18	29	66	31	27	20	20	7
90– 94	15		11	57	23	31	2	3	1	17	31	82	39	39	27	20	12
85– 89	19		18	30	17	44	1	2		14	23	80	25	37	32	18	16
80– 84	14		19	38	30	31	4	2		9	41	78	44	42	39	13	13
75– 79	21		20	45	27	48	8	2	2	20	44	83	50	35	36	15	26
70– 74	29		19	50	22	42	8	3	1	17	44	115	59	53	49	30	23
65– 69	27		24	45	30	32	5	3	3	31	32	89	52	47	57	32	27
60– 64	36		29	33	34	40	6	4	4	27	55	104	64	58	46	41	33
55– 59	37		26	50	25	36	6	5	4	25	46	120	63	51	44	45	28
50– 54	36		39	52	30	30	4	5	2	35	49	111	87	53	47	37	30
45– 49	39		38	35	46	41	7	4	1	50	45	116	67	58	54	43	42
40– 44	43		31	42	30	38	7	5	3	41	40	111	71	52	47	51	36
35– 39	53		40	41	36	51	4	1	4	68	52	93	76	49	56	51	47
30– 34	66		61	43	19	37	8	1	2	54	52	105	78	57	41	55	59
25– 29	45		54	40	33	36	3	1	3	69	51	103	73	49	29	59	55
20– 24	48		64	32	23	17	6	1	3	44	39	65	68	34	34	62	52
15– 19	56		58	24	22	18	10			52	29	78	52	31	31	63	36
10– 14	49		54	19	11	18	6	1	3	51	23	62		26	13	51	44
5– 9	38		44	11	12	9	6	1	4	35	17	46	1	20	7	40	32
0– 4	23		15	5	8	8	8	2	3	17	3	29		8	3	22	18
Total	779		710	975	682	832	128	77	55	762	943	2,145	1,171	1,029	861	837	702

TABLE 205.—*Variables Alpha × State. Groups I and II: White draft*—Continued.

Alpha score.	Maine.	Maryland.	Massachusetts.	Michigan.	Minnesota.	Mississippi.	Missouri.	Montana.	Nebraska.	Nevada.	New Hampshire.	New Jersey.	New Mexico.	New York.	North Carolina.	North Dakota.	Ohio.
205–212			1											1			
200–204														7			1
195–199			2											2			2
190–194			1									2		5			3
185–189				1				3			1	3		3		2	2
180–184	3		3	3			1				1		1	7		1	1
175–179	1		5				4	2		1	1	4		8		3	13
170–174	4	2	7	3	1	1	5		2		1	4		13			14
165–169	5	2	5	3	2	1	2	1	4	1	3	4		16		4	17
160–164	5	2	8	5	5	1	5	2	4	1	3	8	1	18	2	3	21
155–159	8	2	13	4	6		7	1	1		5	6		18	2	5	19
150–154	7	2	12	13	3		5	4	2	1	3	8	1	21	3	4	28
145–149	5	5	23	9	7		9	9	3		2	6	1	19	2	5	32
140–144	11	6	16	6	9	2	7	3	6		10	4	2	35	4	8	44
135–139	6	4	20	15	9	2	12	5	5		8	6	2	33	3	11	44
130–134	4	3	27	11	9	1	20	5	9		12	10	2	46	2	9	56
125–129	14	6	22	17	13	4	14	10	10	2	7	15	2	50	1	9	39
120–124	13	7	18	14	8	3	17	9	10	3	20	10	2	58	6	10	43
115–119	14	6	26	20	15	8	22	25	12	1	12	13	6	54	6	12	65
110–114	10	8	30	24	15	5	20	10	18	1	39	21	1	81	9	22	70
105–109	18	14	24	33	19	5	28	18	21	5	15	16	1	87	9	21	56
100–104	11	15	40	25	19	5	35	21	19	5	36	15	4	76	14	15	69
95– 99	25	16	46	38	15	10	24	24	24	2	20	21	4	114	15	29	89
90– 94	27	24	42	32	25	9	34	33	28	2	32	11	5	124	11	28	74
85– 89	17	17	46	46	26	18	49	28	21	2	9	21	9	127	18	26	93
80– 84	24	16	45	39	34	18	56	29	32		35	33	7	109	10	26	106
75– 79	35	26	48	44	36	11	54	26	32	4	12	25	10	125	21	33	101
70– 74	43	36	57	61	34	22	52	33	43	5	27	21	9	143	33	35	103
65– 69	37	29	68	64	43	30	54	47	41	6	17	19	10	129	15	32	103
60– 64	34	30	63	57	47	35	74	42	37	13	44	39	13	180	21	41	103
55– 59	40	32	41	55	46	25	77	39	36	9	20	46	12	165	23	37	120
50– 54	25	36	59	63	36	41	67	47	39	7	69	45	4	178	31	32	114
45– 49	48	34	64	50	50	46	79	31	43	7	20	43	9	155	35	61	124
40– 44	38	28	60	67	35	46	64	33	29	5	65	35	12	184	47	46	135
35– 39	37	32	60	55	41	65	71	27	44	5	18	44	9	192	50	44	105
30– 34	33	38	50	55	39	59	80	21	35	7	72	35	18	151	41	47	113
25– 29	37	34	47	64	42	73	73	17	25	2	18	42	12	177	59	41	84
20– 24	47	34	40	59	36	46	66	14	15	2	51	59	7	135	66	39	63
15– 19	50	33	26	48	22	53	53	11	20	4	42	42	11	120	54	49	79
10– 14	38	19	34	51	24	51	52	4	7	1	33	45	15	109	44	25	40
5– 9	13	8	24	27	11	36	31		2	2	24	44	14	86	31	13	24
0– 4	8	10	18	17	4	27	6			3	13	120	3	51	24	4	9
Total	795	616	1,241	1,196	786	759	1,329	634	679	108	817	937	218	3,300	702	799	2,318

Alpha score.	Oklahoma.	Oregon.	Pennsylvania.	Rhode Island.	South Carolina.	South Dakota.	Tennessee.	Texas.	Utah.	Vermont.	Virginia.	Washington.	West Virginia.	Wisconsin.	Wyoming.	Grand total.
205–212				1												3
200–204																2
195–199		1	3							1					1	17
190–194		1	2			1				1						17
185–189		4	2	1		1		1		1		2		1		38
180–184		1	4			1			1	3		3	1			49
175–179	1	2	7			1			1	5		7		1	1	71
170–174	2		13	2		2	3	3		6	1	4		4	4	125
165–169	1	3	15	2		6	2	4	4	5		7	2	5	1	145
160–164		4	14	3	2	8		4	3	7	1	6		4	3	190
155–159	1	9	26			4	3	3	6	6	2	6	1	8	5	243
150–154	3	12	26	2	3	3	1	3	5	9	3	13	6	4	1	270
145–149	8	13	29	3	1	6	1	6	7	15	4	10	3	5	4	342
140–144	2	9	29	2	2	4	5	4	5	10	3	10	2	10	2	340
135–139	4	14	25	12	4	9	2	3	5	5	4	23	3	15	8	436
130–134	3	19	37	6		8	10	15	12	9	4	15	3	5	9	511
125–129	11	17	52	5	3	11	2	7	12	11	5	25	3	9	7	597
120–124	6	15	55	8	5	13	8	12	14	10	8	14	4	14	8	595
115–119	8	24	59	17	7	11	9	17	11	20	7	24	11	22	20	789
110–114	12	25	74	11	4	11	11	12	15	22	15	17	11	27	16	870
105–109	14	25	78	17	8	15	12	18	19	21	13	30	7	24	14	959
100–104	16	29	94	12	13	20	16	19	20	22	13	27	11	20	20	1,061
95– 99	14	27	107	21	9	16	13	31	18	21	10	25	10	26	19	1,166
90– 94	19	37	115	26	14	11	20	21	21	29	9	32	12	33	22	1,382
85– 89	26	33	116	28	14	28	20	33	34	24	24	51	15	34	28	1,433
80– 84	26	51	136	30	15	25	27	33	30	33	20	43	13	38	25	1,576
75– 79	19	43	142	41	14	30	17	55	33	34	17	43	10	36	23	1,675
70– 74	22	39	136	38	19	39	12	50	44	29	21	36	18	41	23	1,886
65– 69	29	47	156	37	24	42	25	48	35	43	27	40	18	37	2.	1,908
60– 64	43	31	147	47	21	32	25	71	29	38	22	36	21	42	27	2,119
55– 59	39	48	159	37	34	43	29	69	43	32	26	56	26	50	32	2,157
50– 54	39	39	158	24	31	50	28	57	40	39	25	46	23	46	23	2,208
45– 49	46	37	170	49	44	55	46	90	36	41	24	46	26	65	29	2,389
40– 44	46	27	180	36	35	51	41	78	46	53	32	41	20	70	33	2,366
35– 39	55	39	184	39	49	42	45	90	52	60	20	38	21	59	30	2,444
30– 34	53	40	160	33	38	45	40	111	35	47	24	30	27	51	28	2,394
25– 29	53	33	135	40	37	36	51	86	41	46	20	32	25	41	20	2,246
20– 24	65	29	130	27	47	41	54	80	37	26	30	18	22	46	17	2,040
15– 19	61	25	95	31	37	24	21	64	26	21	20	15	21	48	17	1,855
10– 14	46	19	103	24	31	2	48	86	25	24	20	20	14	37	13	1,535
5– 9	47	9	54	28	13		43	81	14	16	17	16	6	31	9	1,097
0– 4	25	8	53	3	3	1	20	31	7	11	5	6	7	3	5	677
Total	865	888	3,280	743	581	748	710	1,426	786	856	506	910	423	1,012	567	44,223

TABLE 206.—*Variables: Beta score × State. Groups I and II: White draft.*

For men who took beta only, or alpha and beta, or beta and an individual examination, or alpha, beta, and an individual examination.

Beta score.	Alabama.	Arizona.	Arkansas.	California.	Colorado.	Connecticut.	Delaware.	District of Columbia.	Florida.	Georgia.	Idaho.	Illinois.	Indiana.	Iowa.	Kansas.	Kentucky.	Louisiana.
115–118																	
110–114												1					
105–109				2	2									1			
100–104				2	1	1				1		4					
95–99			1	1	1						1	8			1		2
90–94				2	2						10	13		1			
85–89				6	2					1	7	13	2				
80–84				20	5	1				2	9	26	1	1	4	1	2
75–79	3		4	10	3	2				5	22	20	4	4	4		3
70–74	4		3	32	7					4	22	43	1	11	6	2	3
65–69	6		3	33	7	5		3	1	5	27	44	8	9	12		9
60–64	16		16	24	4	5	1	5	1	16	34	68	4	13	11	2	24
55–59	9		15	24	6	5	1	3		19	24	64	9	14	12		23
50–54	20		23	48	9	10	2	2		25	28	76	7	16	24	2	29
45–49	19		37	29	8	14	2	4	1	24	18	57	13	14	14		19
40–44	30		30	32	5	15	2	4	1	24	17	47	17	18	16	6	37
35–39	31		42	34	12	23	2	4	1	30	8	52	6	15	11	2	30
30–34	37	1	36	40	5	24	1	2	2	24	10	53	19	8	11	22	28
25–29	43		37	12	6	15		2	1	28	5	55	15	10	14		35
20–24	33		49	20	8	22	2	1	1	20	4	42	12	7	8	28	47
15–19	39		36	8	10	33	2	1	1	24	1	26	13	5	2		29
10–14	48		23	4	7	19	3	2	1	22		36	8	9	2	54	23
5–9	34		9		3	12	1	3		18		19	8	3	1	41	6
0–4	30		5		3	8			1	5	1	5	6	2	1	28	10
Total	402	1	369	383	116	214	19	36	12	297	248	772	153	161	153	188	359

Beta score.	Maine.	Maryland.	Massachusetts.	Michigan.	Minnesota.	Mississippi.	Missouri.	Montana.	Nebraska.	Nevada.	New Hampshire.	New Jersey.	New Mexico.	New York.	North Carolina.	North Dakota.	Ohio.
115–118									1					2			
110–114					1								1	2			
105–109		1			3		1						2				
100–104		1	2	1	1		1					2	4	4			
95–99			1	1	7			2	1		1			6		1	
90–94	1	1	2	1	8			2	1	1		1	6	17		1	
85–89	2	2	2	2	11		4	5	5	1	4	1	6	20		2	
80–84	4	6	2	3	22	2	3	9	4	3	8	3	14	39	1	3	1
75–79	8	7	7	7	37	2	4	16	5	2	6	3	4	59		9	2
70–74	18	9	8	13	36	6	8	18	14	3	4	4	10	71		14	1
65–69	18	11	14	16	48	4	11	24	28	4	22	6	10	109	5	12	3
60–64	17	29	24	28	28	10	15	34	25	4	27	6	12	111	10	23	5
55–59	33	26	21	16	30	12	19	28	35	3	20	16	19	109	11	24	3
50–54	21	30	30	22	28	30	37	27	44	1	23	27	24	101	14	33	3
45–49	30	21	40	29	27	9	40	40	37	2	22	18	15	144	20	30	3
40–44	29	32	29	26	21	41	39	35	33		26	30	29	130	25	19	3
35–39	21	28	34	34	21	26	33	31	26	2	19	32	27	139	35	22	11
30–34	24	37	50	37	19	42	37	13	20	1	18	38	32	128	42	13	6
25–29	20	33	39	28	15	25	43	40	24	9	18	39	32	116	57	10	7
20–24	16	34	60	25	2	52	42	29	23	1	20	42	27	87	57	17	6
15–19	15	34	20	17	8	15	22	11	3	1	6	35	36	97	47	3	6
10–14	15	21	14	18	3	26	12	2			13	32	48	88	34	4	2
5–9	8	22	17	16		13	7				8	32	26	54	25		2
0–4	2	10	4	9	1	5	1				29		8	35	11		4
Total	302	395	420	349	380	320	379	366	329	38	294	367	392	1,668	394	240	68

TABLE 206.—*Variables: Beta × State. Groups I and II: White draft*—Continued.

Beta score.	Oklahoma.	Oregon.	Pennsylvania.	Rhode Island.	South Carolina.	South Dakota.	Tennessee.	Texas.	Utah.	Vermont.	Virginia.	Washington.	West Virginia.	Wisconsin.	Wyoming.	Total.
115–118	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	5
110–114	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	7
105–109	1	.....	1	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	16
100–104	.....	2	1	.....	.....	.....	.....	1	1	.....	4	2	.....	.....	.....	36
95– 99	1	2	2	.....	.....	1	.....	2	1	.....	.....	3	.....	1	2	50
90– 94	5	2	5	1	1	1	.....	5	2	3	.....	4	.....	1	.....	100
85– 89	2	7	5	1	2	6	.....	3	3	1	.....	9	2	4	1	147
80– 84	3	12	3	5	6	10	.....	7	14	2	.....	9	6	3	8	287
75– 79	4	21	17	7	12	13	2	9	21	3	1	20	4	5	13	414
70– 74	5	24	18	10	8	11	6	13	24	7	.....	15	19	7	13	555
65– 69	11	27	22	23	10	19	6	6	25	10	4	23	23	8	12	746
60– 64	11	24	28	22	11	26	16	24	34	8	1	21	25	15	15	933
55– 59	26	28	33	21	20	32	18	25	22	18	3	26	40	10	15	990
50– 54	23	23	45	21	33	28	27	32	26	13	4	23	29	8	7	1,158
45– 49	18	20	45	25	36	24	31	33	22	27	3	21	29	16	13	1,163
40– 44	25	14	39	29	39	24	27	36	12	27	10	13	58	15	4	1,220
35– 39	30	8	48	31	37	14	38	36	16	16	12	15	32	15	4	1,196
30– 34	24	12	73	18	45	14	24	40	13	15	14	16	49	21	5	1,252
25– 29	31	9	65	24	49	12	23	42	8	19	11	7	54	19	1	1,207
20– 24	18	3	56	25	39	11	32	39	5	9	15	6	62	12	.....	1,176
15– 19	25	.....	38	20	41	2	24	32	3	13	19	5	52	18	2	900
10– 14	18	2	28	22	28	.....	20	34	2	15	26	2	38	10	.....	838
5– 9	10	1	22	13	18	.....	20	25	4	6	18	1	28	10	.....	564
0– 4	11	.....	7	10	10	.....	3	29	.....	3	15	.....	23	3	.....	338
Total	302	242	602	328	447	248	317	473	258	215	160	241	573	203	115	15,308

CHAPTER 6.

RELATION OF INTELLIGENCE RATINGS TO NATIVITY.

Out of some 94,000 men of the white draft whose records were used in the principal sampling for Hollerith analysis approximately 13,200 reported that they were born in a foreign country. If these figures can be taken as an index of the total Army population, it means that about 18 per cent of the Army was foreign born. The 1910 census gives the percentages of white foreign-born individuals in the United States as 14.2 per cent. The approximate agreement of the census figures with those obtained in the sampling is an indication of the representativeness of our sample.

There is a wide variation in the number of men coming from different countries. Italy, with over 4,000 men, forms nearly one-third of the total group. From Russia there were over 2,300 men. On the other hand, there were many countries from which less than 10 men were reported. In the comparison of the intelligence ratings of the foreign born only those countries were considered from which 100 or more cases were reported in the group selected by the sampling. The number of men included under this basis of selection is all but about 800 of those reporting foreign birth. Table 213 shows the type of examination that was taken by these foreign-born men, and in table 214 the same results are expressed on a percentage basis.

TABLE 207.—*Variables: Alpha score × nativity. Groups I, II, III: White draft (foreign born).*

For all men who took alpha only.

Alpha score.	Nativity.																
	Austria.	Belgium.	Canada.	Denmark.	England.	Germany.	Greece.	Holland.	Ireland.	Italy.	Norway.	Poland.	Russia.	Scotland.	Sweden.	Turkey.	Others.
205-212					1												
200-204																	
195-199																	
190-194					1												
185-189					1												
180-184					1	1							1	1			
175-179			1			1								1			
170-174			5					1	1	1			2				
165-169			3		3				2						1		
160-164	1		1		1								2	1		1	
155-159	1		3		4			1			1			1	1		
150-154			1		2	3				1	1		1		1		
145-149			4		2	3		1	1					1	1		1
140-144			10		1	2		1	2	2	1		3	2	2		2
135-139	2		4		7			1	2	1	1		3		3	1	
130-134			10	3	7			1		2			4				1
125-129	1		8		6	1		1	3	1	2		4	3	4	1	
120-124			8		9	4			4	2	4		9		2	1	2
115-119			12	2	10	3	1	1	5	3	4	1	15	1		1	1
110-114	1		14	3	9	3	2	2	4	1	3		6	1	2	1	1
105-109	1		15	4	15	3		2	3	4	3		13	6	6	3	2
100-104	2		19	3	11	6	1	1	4	4	4	2	11	5	9	3	
95- 99	1		26	6	12	6	1	1	8	5	1		15	10	5		3
90- 94		1	25	6	15	9		1	8	4	12		13	3	9	1	4
85- 89	1	3	17	5	26			8	14	9	3	1	19	8	13	2	2
80- 84	9	3	33	8	22	9	2	4	8	8	9	3	14	5	11	2	1
75- 79	2	2	20	9	10	7		5	11	15	12	3	21	5	13	6	4
70- 74	2		32	6	29	9	2	2	12	15	8	1	25	8	12	3	
65- 69	8	1	33	9	19	7	3	3	14	20	18		20	6	16	1	4
60- 64	5	1	30	10	21	13	5	9	17	16	7		29	8	23	2	5
55- 59	8	1	35	8	26	13	7	7	16	19	7	4	29	8	19	5	5
50- 54	5	5	48	11	22	7	11	5	24	34	13	5	35	5	16	10	3
45- 49	8	2	41	19	20	11	12	3	32	34	13	5	28	6	16	7	6
40- 44	16	2	32	14	15	22	12	5	36	33	8	5	43	9	27	7	3
35- 39	8	4	27	10	11	13	11	3	35	40	11	7	46	4	23	14	5
30- 34	10	4	39	6	10	9	13	4	34	51	15	2	44	2	13	7	8
25- 29	12	2	29	6	7	9	12		42	58	13	10	41	5	13	10	4
20- 24	6	2	20	4	7	14	9	2	33	44	11	7	43	6	9	3	3
15- 19			9	3	6	4	6	2	8	18	6	2	19	1	4	5	
10- 14	4	2	7	1	4	4	5	1	16	29	4	5	25	2	9		1
5- 9	1		4	1		4	5		23	97							
0- 4					1					1	2	7	50	1	2	7	3
Total	115	35	625	157	374	200	120	78	422	575	197	70	633	125	287	104	74

TABLE 208.—*Variables: Beta score × nativity. Groups I, II, III: White draft (foreign born).*

For men who took beta only, or alpha and beta.

Beta score.	Nativity.															
	Austria.	Belgium.	Canada.	Denmark.	England.	Germany.	Greece.	Holland.	Ireland.	Italy.	Norway.	Poland.	Russia.	Scotland.	Sweden.	Turkey.
115–118										1			1			
110–114	1															
105–109				2				2					1			
100–104										5			6			
95– 99	1		1	3	1	1		1		2	2	1	1			1
90– 94	1	1	2	1	1		9			11	3		1	1	7	5
85– 89	4	2	4	4		6	2	3		17	5	1	3		11	5
80– 84	1	4	6	12	2	10	6	7	1	32	9	2	14	1	16	5
75– 79	3	4	16	11	3	9	10	6	1	48	25	2	13		20	13
70– 74	6	7	16	12	2	8	22	7	1	73	26	7	22		18	10
65– 69	15	9	25	21	2	6	18	5	7	106	42	4	39	1	44	11
60– 64	17	12	29	23	2	18	24	3	9	153	35	8	56		51	18
55– 59	13	11	30	14	3	17	40	10	9	156	49	13	75	2	51	31
50– 54	9	14	27	16	1	10	46	11	10	205	45	6	83	5	46	27
45– 49	12	7	34	15	1	7	43	1	14	243	42	19	101	1	30	28
40– 44	10	7	31	13	1	4	47	4	19	254	36	22	119	1	36	27
35– 39	18	3	21	8	2	4	37	1	29	288	26	22	153	2	21	14
30– 34	16	6	25	7	3	2	46	1	22	294	23	32	151	1	19	27
25– 29	9	2	21	4	1	2	25	1	28	289	17	29	165	4	15	21
20– 24	19	3	17	1	4	11	19	1	28	260	11	29	161	1	10	21
15– 19	9	1	11		5	1	12		17	175	7	21	95	1	1	19
10– 14	4		4				6		1	117	2	22	54		1	4
5– 9	7		3				7		4	87		11	60			3
0– 4	1		4						5	72	1	12	39			6
Total	176	88	322	167	34	107	419	62	205	2,888	406	263	1,413	21	397	296

TABLE 209.—*Variables: Mental age on Stanford-Binet examination × nativity. Groups I, II, III: White draft (foreign born).*

For men who took Stanford-Binet examination only, or following beta, or following alpha, or following alpha and beta.

Mental age on Stanford-Binet examination.	Nativity.															
	Austria.	Belgium.	Canada.	Denmark.	England.	Germany.	Greece.	Holland.	Ireland.	Italy.	Norway.	Poland.	Russia.	Scotland.	Sweden.	Turkey.
13.0–13.4			1													
12.5–12.9																
12.0–12.4									1				1			
11.5–11.9										3						
11.0–11.4							2		1	3	2		1			
10.5–10.9			2							3	1	1	2		1	1
10.0–10.4	2		1		1				2	6		2	4			
9.5– 9.9	1		2				1		3	10	1	1	6		1	
9.0– 9.4			4		1				16	27	1		21		2	3
8.5– 8.9	1		2				1			21		1	5			
8.0– 8.4			1							15			4		1	
7.5– 7.9									1	1		1				
7.0– 7.4													1			
6.5– 6.9									1			2	1			
6.0– 6.4																
5.5– 5.9										1						
5.0– 5.4										1						
4.5– 4.9																
4.0– 4.4																
3.5– 3.9																
3.0– 3.4																
2.5– 2.9																
Total	4		13		2		4		25	91	5	8	46		5	4

TABLE 210.—*Variables: Score on performance scale examination × nativity. Groups I, II, III: White draft (foreign born).*

For men who took performance scale examination only, or following beta, or following alpha, or following alpha and beta.

Score on performance scale examination.	Nativity.															
	Austria.	Belgium.	Canada.	Denmark.	England.	Germany.	Greece.	Holland.	Ireland.	Italy.	Norway.	Poland.	Russia.	Scotland.	Sweden.	Turkey.
210–219					1					1						
200–209										1			2			
190–199		1								1			2			
180–189							2			1		1				
170–179	1						2			3			7			1
160–169				1			1		1	10		2	2			
150–159			3							8			6			1
140–149			1				1			12		3	11			1
130–139							2			13		3	7			1
120–129	1		1				2			15		3	17		1	1
110–119							1			17	1	3	14		1	3
100–109			1				3		1	36		5	22			
90– 99							2			34		1	18			3
80– 89	1	1	2			1			2	30	1	3	37			2
70– 79			1				1		1	50	1	5	29			1
60– 69	1						1			81		5	24			1
50– 59			2				4		1	57		4	17			1
40– 49			1				2			34			13			
30– 39	1	4								28		2	7			
20– 29							5			12			6			3
10– 19	1									10		1	4			
0– 9										1			3			
Total	6	6	12	1	1	1	29	0	6	455	3	41	248	0	2	19

TABLE 211.—*Variables: Alpha score × nativity. Groups I, II, and III: White draft (foreign born).*

For men who took alpha only, or alpha and beta, or alpha, and an individual examination.

Alpha score.	Nativity.																Total.
	Austria.	Belgium.	Canada.	Denmark.	England.	Germany.	Greece.	Holland.	Ireland.	Italy.	Norway.	Poland.	Russia.	Scotland.	Sweden.	Turkey.	
205–212					1												1
200–204																	
195–199																	
190–194					1												1
185–189					1												1
180–184					1	1							1	1			4
175–179			1			1								1			3
170–174			5					1	1	1			2				10
165–169			3		3				2						1		9
160–164	1		1		1								2	1		1	7
155–159	1		3		4			1						1	1		11
150–154			1		2	3				1	1		1		1		10
145–149			4		2	3		1	1		1			1	1		14
140–144			10		1	2		1	2	2			3	2	2		25
135–139	2		4		7			1	2	1	1		3		3	1	25
130–134			10	3	7			1		2	1		4				28
125–129	1		9		6	1		1	3	1	2		4	3	4	1	36
120–124			8		9	4			4	2	4		9		2	1	43
115–119			12	2	10	3	1	1	5	3	4	1	15	1		1	59
110–114	1		14	3	9	3	2	2	4	1	3		6	1	2	1	52
105–109	1		15	4	15	3		2	3	4	3		13	6	6	3	78
100–104	2		19	3	11	6	1	1	4	4	4	2	11	5	9	3	85
95– 99	1		26	6	12	8	1	1	8	5	1		15	10	5		97
90– 94		1	25	8	15	9		1	8	4	12		13	3	9	1	107
85– 89	1	3	17	5	26			8	14	9	3	1	19	8	13	2	129
80– 84	9	3	33	8	22	9	2	4	8	8	9	3	14	5	11	2	150
75– 79	2	2	20	9	10	7		5	11	15	12	3	21	5	13	6	141
70– 74	2		32	6	29	9	2	2	12	15	8	1	25	8	12	3	166
65– 69	8	1	33	9	19	7	3	3	14	20	18		20	6	16	1	178
60– 64	5	1	30	10	21	13	5	9	17	16	7		29	8	24	2	197
55– 59	8	1	35	8	26	13	7	7	16	19	7	4	30	8	19	5	213
50– 54	5	5	48	11	22	7	11	5	25	35	13	5	36	5	16	10	259
45– 49	8	2	41	19	21	11	12	3	32	34	13	5	28	6	16	8	259
40– 44	17	2	32	14	16	23	13	5	36	33	9	5	43	9	27	7	291
35– 39	8	4	27	11	12	13	11	4	35	41	12	7	46	5	24	14	274
30– 34	10	4	40	6	10	10	14	4	35	56	16	3	45	2	13	7	275
25– 29	12	2	33	6	7	12	15		45	63	14	10	46	6	18	11	300
20– 24	8	2	30	4	7	17	19	2	47	60	13	10	53	8	15	7	302
15– 19	3	1	38	3	11	8	14	3	32	49	6	2	31	1	5	14	221
10– 14	7	2	23	1	6	7	20	1	49	77	9	5	52	2	12	9	282
5– 9	2		13	1	5	5	17		55	121	4	1	18	1	1	6	250
0– 4	1		7		3	1	4	1	28	22	2	8	51	1	2	13	144
Total	126	36	702	158	391	217	174	81	558	724	212	76	709	130	303	140	4,737

TABLE 212.—*Variables: Beta score × nativity. Groups I, II, and III: White draft (foreign born).*

For men who took beta only, or alpha and beta, or beta and an individual examination.

Beta score.	Nativity.																Total.
	Austria.	Belgium.	Canada.	Denmark.	England.	Germany.	Greece.	Holland.	Ireland.	Italy.	Norway.	Poland.	Russia.	Scotland.	Sweden.	Turkey.	
115–118	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	2
110–114	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
105–109	.....	.....	.....	2	.....	.....	.....	2	.....	.....	.....	.....	1	.....	.....	.....	5
100–104	.....	.....	.....	.....	.....	.....	.....	.....	.....	5	.....	.....	6	.....	.....	.....	11
95– 99	1	.....	1	3	1	1	.....	1	.....	2	2	1	1	.....	.....	1	15
90– 94	1	1	2	1	1	.....	9	.....	.....	11	3	.....	1	1	7	5	43
85– 89	4	2	4	4	.....	6	2	3	.....	17	5	1	3	.....	11	5	67
80– 84	1	4	6	12	2	10	6	7	1	32	9	2	14	1	16	5	128
75– 79	3	4	16	11	3	9	10	6	1	48	25	2	13	.....	20	13	184
70– 74	6	7	16	12	2	8	22	7	1	73	26	7	22	.....	18	10	237
65– 69	15	9	25	21	2	6	18	5	7	106	42	4	39	1	44	11	355
60– 64	17	12	29	23	2	18	24	3	9	153	35	8	56	.....	51	18	458
55– 59	13	6	30	14	3	7	40	10	9	156	49	13	75	2	51	31	509
50– 54	9	14	27	16	1	10	46	9	10	205	45	6	83	5	46	27	559
45– 49	12	7	34	15	1	7	43	1	14	243	42	19	101	1	30	28	598
40– 44	10	7	31	13	1	4	47	4	19	254	37	22	120	1	36	27	633
35– 39	18	3	21	8	2	4	37	1	20	289	26	22	153	2	21	14	650
30– 34	16	17	25	7	3	3	46	1	22	294	23	32	151	1	19	27	687
25– 29	10	2	22	4	1	2	31	1	28	302	17	29	170	4	15	23	661
20– 24	20	3	19	1	4	2	21	1	30	290	12	29	174	1	10	22	639
15– 19	12	1	11	.....	5	3	20	.....	20	280	10	28	150	1	2	29	572
10– 14	5	.....	6	.....	.....	.....	14	.....	5	276	7	29	136	.....	4	17	499
5– 9	10	1	5	.....	.....	.....	13	.....	12	211	.....	20	125	.....	1	10	408
0– 4	2	.....	4	.....	.....	.....	5	.....	7	150	1	19	87	.....	.....	13	288
Total	186	100	334	167	34	100	454	62	224	3,398	416	293	1,682	21	402	336	8,209

TABLE 213.—*Number of men from each foreign country who received final grades on the basis of each type of examination.*

Type of examination.	Austria.	Belgium.	Canada.	Denmark.	England.	Germany.	Greece.	Holland.	Ireland.	Italy.	Norway.	Poland.	Russia.	Scotland.	Sweden.	Turkey.	Total.
Alpha	115	35	625	157	374	200	120	78	422	575	197	70	633	125	287	104	4,117
Beta	176	88	322	167	34	98	419	62	205	2,886	406	263	1,413	21	397	296	7,253
Stanford-Binet	4	.....	13	.....	2	.....	4	.....	25	91	5	8	46	.....	5	4	207
Performance	6	6	12	1	1	1	29	.....	6	455	3	41	248	.....	2	19	830
Point scale [1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Number of cases	301	129	972	325	411	299	572	140	658	4,007	611	382	2,340	146	691	423	12,407

[1] Only 30 men of this group were given point scale examination, and these scores were not tabulated.

TABLE 214.—*Percentage of men from each foreign country receiving final ratings on the basis of each type of examination.*

Type of examination.	Austria.	Belgium.	Canada.	Denmark.	England.	Germany.	Greece.	Holland.	Ireland.	Italy.	Norway.	Poland.	Russia.	Scotland.	Sweden.	Turkey.	Total.	Total of white draft (Groups I, II, III) for comparison.
Alpha	38.4	27.1	64.5	48.5	91.0	67.0	21.0	56.0	64.0	14.4	32.5	18.7	27.0	85.6	41.5	24.7	33.7	71.8
Beta	58.5	68.1	33.0	51.5	8.3	32.9	73.0	44.3	31.2	72.0	66.6	68.6	60.4	14.4	57.5	70.0	58.3	24.7
Stanford-Binet	1.3	.....	1.3	.....	.4	.....	.7	.....	3.8	2.3	.8	2.1	1.9	.....	.7	1.9	1.6	1.4
Performance	2.0	4.7	1.2	.....	.3	.3	5.5	.....	.9	11.4	.4	10.7	10.5	.....	.2	4.5	6.6	1.4
Point scale [1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Number of cases	301	129	972	325	411	299	572	140	658	4,007	611	382	2,340	146	691	423	12,407	93,973

[1] Only 30 men in the group were given a point scale examination, and these scores were not tabulated.

Men from the English-speaking countries are the only ones, with the exception of Germany, who took alpha in large numbers. The percentage of men from England and Scotland who took alpha is even higher than the percentages of the whole white draft who took alpha. Italy sent the lowest proportion of men to alpha, while Poland and Greece also stood low in this respect.

When we come to consider the individual examinations we find that there were more than five times as many performance examinations given as the others. Only 30 men in the whole group were given the point scale examination, and the results of these were not tabulated.

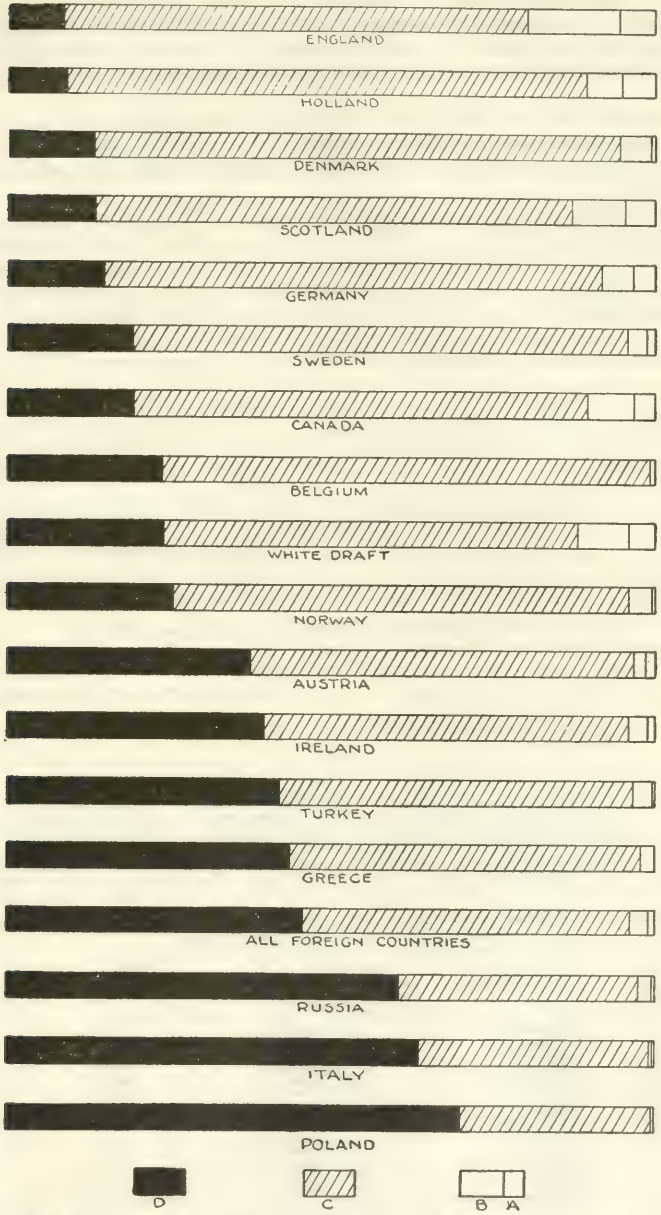

FIG. 19. Percentage distribution of letter grades in intelligence by nativity of foreign-born men in draft.

In the case of men from Holland and Scotland no individual examinations at all were found necessary, and the percentage of these examinations among the English-speaking and the Scandinavian units was very small. The greatest number of individual examinations were given to Italians, although approximately the same proportion was necessary with the Russians and the Poles.

In comparison with the white draft as a whole the foreign-born men required beta and individual examinations more than twice as frequently as the whole Army group. The high proportion is at least partially explained, of course, by the large foreign-speaking element among the foreign born.

The letter grades obtained by the foreign-born men are distributed by number in table 215 and by percentage in table 216. In table 217 are shown the rank order of the countries according to the percentage of final ratings better than D and also according to the percentage of A and B ratings combined. Figure 19 shows the percentage of letter ratings in each country with the countries arranged in the rank order of the percentage of final ratings above D.

TABLE 215.—*Distribution of letter grades made by foreign-born men.*

Letter grade.	Nativity.																Total.
	Austria.	Belgium.	Canada.	Denmark.	England.	Germany.	Greece.	Holland.	Ireland.	Italy.	Norway.	Poland.	Russia.	Scotland.	Sweden.	Turkey.	
A	5	.....	32	2	24	10	.....	7	8	11	4	.....	20	7	9	2	141
B	5	1	70	16	58	15	12	8	19	26	21	2	53	12	21	13	352
C+	20	15	150	53	98	53	12	30	34	94	55	12	110	37	87	24	904
C−	60	31	277	107	145	83	90	47	124	368	159	28	244	42	184	62	2,051
C	98	51	251	105	56	95	209	35	192	976	220	75	512	28	256	145	3,298
D	88	24	152	40	25	34	200	12	174	1,600	134	165	925	16	118	128	3,830
D−	30	7	40	2	11	9	49	1	87	932	18	100	476	4	16	49	1,831
Total	301	129	972	325	411	299	572	140	658	4,007	611	382	2,340	146	691	423	12,407

TABLE 216.—*Percentage distribution of letter grades made by foreign-born men.*

Letter grade.	Nativity.																Total.	White draft.
	Austria.	Belgium.	Canada.	Denmark.	England.	Germany.	Greece.	Holland.	Ireland.	Italy.	Norway.	Poland.	Russia.	Scotland.	Sweden.	Turkey.		
A	1.7	.....	3.3	0.6	5.6	3.3	.....	5.0	1.2	0.2	0.6	.....	0.4	4.8	1.3	0.4	1.1	4.1
B	1.7	0.8	7.2	4.8	14.1	5.0	2.1	5.7	2.9	.6	3.5	0.5	2.3	8.2	3.0	3.0	2.9	8.0
C+	6.7	11.6	15.4	16.2	24.0	17.6	2.1	21.4	8.4	2.3	8.9	3.1	4.8	25.4	12.6	5.7	7.3	15.2
C	32.3	39.2	25.8	32.4	12.4	31.8	36.7	25.0	29.0	24.4	36.0	19.5	22.1	19.2	37.0	34.4	26.6	23.8
C−	29.0	24.0	28.4	33.0	35.4	27.8	15.7	33.7	18.6	9.1	25.9	7.3	10.5	28.8	26.8	14.7	16.5	25.0
D	27.5	18.6	15.4	12.8	6.0	11.7	35.1	8.5	26.2	40.0	21.8	43.5	40.0	10.9	17.1	30.4	30.8	17.0
D−, E	10.0	5.4	4.1	.6	2.7	3.3	8.5	.7	13.2	23.4	3.8	26.4	20.4	2.7	2.3	11.6	14.8	7.1
Number cases	301	129	972	325	411	299	572	140	658	4,007	611	382	2,340	146	691	423	12,407	94,004

TABLE 217.—*Rank order of countries according to percentage of final letter grades better than D and also according to the percentage of A and B letter grades combined.*

Rank order.	Per cent D, D−, E.	Rank order.	Per cent A, B.
England	8.7	England	19.7
Holland	9.2	Scotland	13.0
Denmark	13.4	White draft	12.1
Scotland	13.6	Holland	10.7
Germany	15.0	Canada	10.5
Sweden	19.4	Germany	8.3
Canada	19.5	Denmark	5.4
Belgium	24.0	Sweden	4.3
White draft	24.1	Norway	4.1
Norway	25.6	Ireland	4.1
Austria	37.5	All foreign countries	4.0
Ireland	39.4	Turkey	3.4
Turkey	42.0	Austria	3.4
Greece	43.6	Russia	2.7
All foreign countries	45.6	Greece	2.1
Russia	60.4	Italy	.8
Italy	63.4	Belgium	.8
Poland	69.9	Poland	.5

The range of differences between the countries is a very wide one. Among the men from England only 8.7 per cent were rated D or less, while among the Poles the percentage making these low ratings was almost 70 per cent. In general, the Scandinavian and English speaking countries stand high in the list, while the Slavic and Latin countries stand low. There is not a perfect relationship between the number of very high grades and the number of very low grades, although some correlation is present.

Comparing the figures in this group with those obtained from the white draft as a whole, we find that only two countries, namely, England and Scotland, exceed the white draft percentage of A's and B's. Most of the countries stand very much below the white draft figures. Considering the lower grades, D, D—, and E, we find that the white draft figures come exactly in the middle of the group. Here again the split is approximately between the Slavic and Latin countries and the others.

After the completion of the preceding analysis the method of combining different examinations outlined in chapter 2 became available and this method has been applied to the national groups shown in table 218. Here the distributions are given in terms of the combined scale, together with the means, standard deviations, and numbers of cases. The mean mental age, stated at the bottom of the table, has the value corresponding to the mean on the combined scale, as indicated by the regression equation. It is less significant than the value in terms of the combined scale, but is given as a rough indication of the meaning of the numbers in this scale. The national groups are arranged in rank order of their means from left to right.

It will be noted that the differences are considerable (an extreme range of practically two years mental age) and that the countries tend to fall into two groups: Canada, Great Britain, the Scandinavian and Teutonic countries all fall in the class interval between 13 and 14 points, whereas the Latin and Slavic countries fall in the class interval between 11 and 12 points. Most of the successive differences, when the difference is compared with its probable error, are significant. The least significant difference lies between Great Britain and Scandinavia. All the differences between the two larger groups mentioned above and many of the others give ratios of the difference to its probable error that are greater than 6.5 (show a probability that the difference is in the direction found of 1.0000, using four-place tables).

TABLE 218.—*Intelligence and nativity of foreign-born recruits (Groups I, II, III) in terms of theoretical combined scale (chap. 2).*

Combined scale.	Canada.	England, Ireland, Scotland.	Denmark, Norway, Sweden.	Germany, Austria.	Greece.	Russia.	Italy.
25–25.9	.....	.....	.....	.....	.....	.....	.....
24–24.9	.....	.....	.....	.....	.....	.....	.....
23–23.9	.....	.....	.....	.....	.....	.....	.....
22	0.6	1.8	1.0	0.5	.....	0.4	.....
21	4.3	5.4	2.4	1.0	.....	2.2	1.0
20	8.5	9.8	3.9	3.7	.....	3.8	2.0
19	16.0	16.7	10.2	7.1	0.8	7.8	6.1
18	28.1	32.2	23.6	10.7	3.0	21.3	17.1
17	48.8	55.9	53.4	19.9	8.0	42.4	34.5
16	77.0	90.2	101.0	35.4	20.1	67.7	67.1
15	104.0	122.8	171.0	54.7	26.8	107.3	137.4
14	134.1	154.4	234.3	78.0	49.8	165.0	236.2
13	163.4	191.7	289.2	103.0	75.0	241.1	380.6
12	141.6	181.8	270.8	103.5	99.5	341.5	515.7
11	87.9	127.5	187.0	69.2	88.9	362.5	579.5
10	55.6	84.1	123.5	42.5	73.2	365.4	604.4
9	37.3	60.4	75.7	30.8	57.6	351.5	551.2
8	21.7	41.1	38.1	18.4	36.3	271.7	406.8
7	10.9	21.6	17.4	10.6	19.3	195.5	254.1
6	4.8	8.9	5.6	5.2	9.1	93.6	126.4
5	1.9	3.3	1.3	2.2	3.6	40.0	53.4
4	1.0	1.1	0.5	0.8	1.2	15.1	20.4
3–3.9	.....	0.4	.....	0.4	0.5	2.7	6.0
2–2.9	.....	.....	.....	.....	.....	1.3	1.6
1–1.9	.....	.....	.....	.....	.....	.....	.....
0–0.9	.....	.....	.....	.....	.....	.....	.....
Mean	13.74	13.37	13.30	13.17	11.90	11.16	11.04
Standard deviation	2.71	2.83	2.41	2.69	2.57	2.96	2.598
Number of cases	948	1,214	1,610	597	573	2,701	4,002
Mean mental age	13.29	13.00	12.95	12.85	11.86	11.28	11.19

CHAPTER 7.

RELATION OF INTELLIGENCE RATINGS TO LENGTH OF RESIDENCE IN UNITED STATES.

The group of 11,295 foreign-born men included in the white draft (Groups I, II, and III) have been analyzed for the relation of their intelligence ratings to the number of years' residence in the United States as reported on the psychological record card. The composition of this group with respect to the type of examination taken is as follows:

Type of examination.	Number of cases.	Per cent.
Alpha only	3,619	32.1
Beta only and alpha-beta only	6,683	59.1
All individual examinations	993	8.8
Total	11,295	.....

The results of the Hollerith analysis for this group are shown in tables 219 to 222. The Hollerith code was by separate units for the first five years of residence and by five-year groups thereafter. In these tables, however, the first six years (0–5, inclusive) have been grouped together so that there are four class intervals of approximately five years each. The last class is for all men over 20 years in this country and includes only persons who have been in America since childhood, for the reason that the upper limit of draft ages was 31.

TABLE 219.—*Variables: Alpha score × years in the United States. Groups I, II, III: White draft, foreign born.*

For men who took alpha only.

Alpha score.	Years in the United States.					
	0–5	6–10	11–15	16–20	Over 20	Total.
205–212	.....	.....	1	.....	.....	1
206–204	.....	.....	.....	.....	.....	0
195–199	.....	.....	.....	.....	.....	0
190–194	.....	.....	.....	.....	.....	0
185–189	.....	.....	.....	.....	.....	0
180–184	1	1	1	1	.....	4
175–179	.....	.....	.....	1	1	2
170–174	2	1	1	.....	3	8
165–169	1	1	3	.....	3	8
160–164	.....	3	1	1	2	7
155–159	1	2	2	2	3	10
150–154	.....	1	3	1	1	9
145–149	4	2	1	3	3	13
140–144	8	5	4	3	4	24
135–139	4	9	8	1	5	27
130–134	2	8	4	6	5	25
125–129	5	8	7	3	13	36
120–124	2	7	9	5	11	34
115–119	6	12	15	13	8	54
110–114	13	11	8	10	4	46
105–109	6	15	14	12	19	66
100–104	10	19	14	12	17	72
95–99	17	18	15	13	23	86
90–94	17	30	21	21	21	110
85–89	15	41	17	22	20	115
80–84	18	43	27	25	26	139
75–79	22	31	26	25	20	127
70–74	36	32	23	19	28	138
65–69	20	30	41	26	22	159
60–64	32	56	35	24	32	179
55–59	35	53	42	29	30	189
50–54	45	60	54	32	34	225
45–49	49	61	58	25	41	224
40–44	46	83	56	37	32	254
35–39	55	83	61	29	25	253
30–34	33	67	66	34	32	232
25–29	39	75	54	25	32	225
20–24	30	68	37	38	13	186
15–19	20	29	21	5	15	100
10–14	15	32	7	3	6	63
5–9	20	23	6	2	3	54
0–4	49	52	11	1	2	115
Total	479	1,068	744	509	559	3,619

TABLE 220.—*Variables: Beta score × years in the United States. Groups I, II, III: White draft, foreign born.*

For men who took beta only or alpha-beta only.

Beta score.	Years in the United States.					
	0–5	6–10	11–15	16–20	Over 20	Total.
115–118	.....	1	.....	.....	.....	1
110–114	.....	1	.....	.....	.....	1
105–109	2	1	.....	.....	.....	3
100–104	3	6	1	.....	.....	10
95– 99	3	5	6	4	1	21
90– 94	20	13	5	1	1	40
85– 89	23	19	11	6	7	66
80– 84	39	52	20	12	4	127
75– 79	61	55	35	10	6	167
70– 74	77	84	42	9	12	224
65– 69	110	144	45	19	12	330
60– 64	110	191	82	22	12	417
55– 59	158	191	78	24	19	470
50– 54	161	192	90	24	15	482
45– 49	164	239	103	20	17	543
40– 44	196	257	90	21	13	577
35– 39	235	263	77	23	13	611
30– 34	231	258	100	12	5	606
35– 29	243	243	77	12	48	624
20– 24	240	224	60	12	6	542
15– 19	126	151	44	15	2	338
10– 14	89	72	27	.....	2	190
5– 9	80	67	13	3	.....	163
0– 4	59	51	15	1	1	127
Total	2,436	2,780	1,021	250	196	6,683

TABLE 221.—*Variables: Performance score × years in the United States. Groups I, II, III: White draft, foreign born.*

For men who took performance scale examination only, or following beta, or following alpha, or following alpha and beta.

Score on performance scale.	Years in the United States.					
	0–5	6–10	11–15	16–20	Over 20.	Total.
220–229	.....	1	.....	.....	.....	1
210–219	1	.....	.....	.....	.....	1
200–209	2	1	.....	.....	.....	3
190–199	3	1	.....	.....	.....	4
180–189	4	4	.....	.....	.....	8
170–179	4	4	2	.....	.....	10
160–169	10	4	1	.....	.....	15
150–159	8	7	1	.....	.....	16
140–149	13	9	7	.....	.....	29
130–139	9	8	4	.....	2	23
120–129	21	14	1	1	.....	37
110–119	17	15	6	1	.....	39
100–109	37	25	5	1	.....	68
90– 99	27	25	3	.....	2	57
80– 89	37	28	6	1	.....	72
70– 79	46	32	6	.....	.....	84
60– 69	50	49	10	1	.....	110
50– 59	46	32	8	.....	.....	86
40– 49	21	26	6	.....	.....	53
30– 39	20	17	2	.....	.....	39
20– 29	14	10	1	.....	.....	25
10– 19	10	7	1	.....	.....	18
0– 9	1	2	.....	1	.....	4
Total	401	321	70	6	4	802

TABLE 222.—*Variables: Stanford-Binet score × years in the United States. Group I, II, III: White draft, foreign born.*

For men who took Stanford-Binet examination only, or following beta, or following alpha, or following alpha and beta.

Mental age on Stanford-Binet examination.	Years in the United States.					
	0–5	6–10	11–15	16–20	Over 20.	Total.
17.5–17.9						
17.0–17.4						
16.5–16.9						
16.0–16.4						
15.5–15.9						
15.0–15.4						
14.5–14.9						
14.0–14.4						
13.5–13.9						
13.0–13.4					1	1
12.5–12.9						
12.0–12.4	1	1				2
11.5–11.9		2	1			3
11.0–11.4	3	4	2			9
10.5–10.9	3	3	4	1	1	12
10.0–10.4	5	10	2			17
9.5– 9.9	5	6	5	1		17
9.0– 9.4	27	31	11	3	2	74
8.5– 8.9	7	17	4	1	1	30
8.0– 8.4	6	10	3			19
7.5– 7.9	2					2
7.0– 7.4		1				1
6.5– 6.9		2				2
6.0– 6.4						
5.5– 5.9	1					1
5.0– 5.4		1				1
4.5– 4.9						
4.0– 4.4						
3.5– 3.9						
3.0– 3.4						
2.5– 2.9						
Total	60	88	32	6	5	191

For purposes of comparison the data of these tables have been combined in terms of the theoretical scale described in chapter 2. For this purpose the scores on the performance scale were transmuted into mental ages by terms of the table in the Examiner's Guide. Scores on beta were taken for men who had taken both alpha and beta. The distributions by class intervals against the theoretical combined scale are shown in table 223, together with their medians and quartiles.

Examination of the median values of table 223 shows an increase from 11.3 to 13.7, about 2.5 of the arbitrary units of this scale. This range is equivalent to something over a difference of 2 years mental age. The increase, it will be noted, is regular from one class interval to another. Successive differences are 0.41, 0.83, 0.97, and 0.24. The dispersion is great and the curves overlap considerably; nevertheless with such a large number of cases the differences between the arrays are mathematically significant. The chances that the difference between the group for 16 to 20 years and that for over 20 years is in the direction noted are 94 per cent. In all other cases such a measure of significance is 100 per cent when measured with four-place tables. The ratios of the differences to their computed quartile deviations (assuming symmetry) range from 9 to 35, with the exception of the single case of the comparison of the two highest groups.

TABLE 223.—*Comparison of foreign-born groups for different numbers of years in the United States in terms of theoretical combined scale of intelligence (alpha, beta, and all individual examinations combined).*

Combined scale.	Years in United States.					Total.
	0–5	6–10	11–15	16–20	Over 20	
22	1.0	0.4	1.0	0.4	0.5	3.3
21	2.8	2.8	2.4	1.6	3.6	13.2
20	5.8	8.1	6.2	3.83	7.4	31.33
19	14.0	18.5	12.98	8.22	12.1	65.8
18	27.8	38.1	27.83	17.94	24.78	136.45
17	55.5	72.7	52.24	32.68	41.11	254.23
16	104.4	142.4	88.51	59.62	66.18	461.11
15	172.5	240.7	139.85	76.99	86.44	716.48
14	265.3	355.2	199.78	115.24	106.35	1,041.87
13	368.8	490.1	273.95	127.44	127.11	1,387.4
12	441.2	597.0	308.72	119.86	113.13	1,579.91
11	461.5	596.9	247.31	86.62	69.95	1,462.28
10	470.9	529.9	189.02	50.39	44.34	1,284.55
9	454.3	474.7	150.88	27.54	28.48	1,135.9
8	342.5	347.4	100.32	17.08	17.77	825.07
7	212.7	207.8	57.38	7.52	9.29	494.69
6	106.8	101.6	26.58	3.92	3.25	242.15
5	44.8	37.2	10.02	1.45	.86	94.33
4	16.4	14.5	3.74	.50	.25	35.39
3	4.7	4.3	1.03	.....	.....	10.03
2	1.5	1.3	.32	.....	.....	3.12
1	.4	.3	.....	.....	.....	.7
Total	3,575.6	4,281.9	1,900.06	758.84	762.89	11,279.29
First quartile	9.36	9.77	10.65	11.94	12.15	9.98
Median	11.29	11.70	12.53	13.50	13.74	12.03
Third quartile	13.34	13.60	14.33	15.15	15.59	13.94
Quartile deviation	1.99	1.91	1.84	1.60	1.72	1.98

The distribution of these foreign-born men by the number of years they have been in the United States is as follows:

Number of years in United States	0–5	6–10	11–15	16–20	Over 20
Per cent of foreign-born draft men (11,295 cases)	31.6	38.0	16.9	6.7	6.8

Approximately 70 per cent fall within the first decade. Very few, however, report coming to this country within the first three years, owing undoubtedly to the lack of immigration during the war.

Apparently then the group that has been longer resident in this country does somewhat better in intelligence examination. It is not possible to state whether the difference is caused by the better adaptation of the more thoroughly Americanized group to the situation of the examination or whether some other factor is operative. It might be, for instance, that the more intelligent immigrants succeed and therefore remain in this country, but this suggestion is weakened by the fact that so many successful immigrants do return to Europe. At best we can but leave for future decision the question as to whether the differences represent a real difference of intelligence or an artifact of the method of examination.

CHAPTER 8.

INTELLIGENCE OF THE NEGRO.

Data of two sorts are available for a consideration of the question of the negro's intelligence. First there is the statistical analysis of the principal sample, and second there are the data which have already been assembled by a number of different examiners and discussed by them in various camp reports. Camp procedure in the examination of recruits was determined by the practical needs of the Army. Examiners conducted their work with the object of rendering maximum practical assistance to the military organization, and the collection and study of scientific data were always incidental to this main purpose. The situation as regards numbers and make-up of the groups of drafted men varied between camps and was necessarily dealt with in somewhat different ways by different examiners. Some of the problems presented by the negro conscripts will be considered briefly below.

The examiner in the camp was confronted by quite a different practical problem when the draft quota to be tested consisted of negroes than that which was presented by a draft quota of white men. The matter of distribution according to grades of intelligence was of less practical importance in the case of negroes, and the matter of elimination was not so much one of excluding the lowest from regular military service as it was one of admitting the highest.

Several different methods of segregation were used to divide the negroes into literate and illiterate groups to send to alpha and beta respectively. In some cases the method was used of making all step out who could not read and write. Usually a standard of proficiency was indicated, as "to read a newspaper and write a letter home." In some cases an educational qualification was added—three, four, or even five years of schooling. In some cases literacy tests were used, though generally as a supplement to the simpler and more direct method of segregation mentioned above. In some cases the negroes were all sent in a body direct to examination beta.

The very large percentage of negroes too illiterate to take alpha placed special emphasis upon the question of the suitability of beta as a test for these subjects. Opinions of examiners differ somewhat on this question, but the general consensus seems to be that beta is not as satisfactory a test for illiterate negro recruits as it is for illiterate whites. Several examiners report that it is difficult to keep up the interest of the negroes in the beta examination as it is usually given. This is especially emphasized in a report from Camp Dodge (July 15, 1918) in which it is stated that, "it took all the energy and enthusiasm the examiner could muster to maintain the necessary attention, as there was a decided disposition for the negroes to lapse into inattention and almost into sleep." Two factors which may have been largely responsible for this condition are, first, the relatively lower intelligence of the negro beta group as a whole; and, second, the fact that, speaking English as they all did, the negroes felt the artificiality of the situation as they would not have felt it if there had been even a sprinkling of non-English-speaking subjects in the group.

Camp Sevier (November 16, 1918) reported that beta as usually given is unsatisfactory as applied to negroes, and suggested as the reason that it "unnaturally limits the negro mind where it is relatively strong—in the use of language." This camp tried examining a draft of negroes with a system of verbal instructions for beta substituted for the usual pantomime. This procedure seemed to yield more satisfactory results. The September draft with which this procedure was employed was universally recognized in camp as distinctly inferior to the

preceding August draft of negroes. The best indication that verbal instructions raise beta scores is contained in a comparison of the median alpha and beta scores of each draft:

Draft.	Men taking alpha.	Median score.	Men taking beta.	Median score.
August	776	26.4	954	18.7
September	401	14.4	1,999	18.6

Although the September draft negroes make a median alpha score only 53 per cent of that made by the August draft, their median score in beta with verbal instructions is exactly the same as the median score of the August draft in standard beta. Opportunity was lacking at Camp Sevier to try beta with verbal instructions on a negro draft of even average quality.

Camp Pike (November 1, 1918) suggests the adoption of the following plan when negroes are to be examined: (1) During rush periods examination alpha to be abandoned except for negroes in specially selected units; and (2) equivalents of letter ratings in beta to be revised in order to get a better distribution as follows:

Letter rating.	Actual.	Proposed.
A	100–118	100–118
B	90– 99	90– 99
C+	80– 89	70– 89
C	65– 79	50– 69
C−	45– 64	30– 49
D	20– 44	20– 29
D−	0– 19	15– 19
		0– 14

The grade of D− covers two groups. Negroes making scores from 15 to 19 should be interviewed and examined further if time permits, and those making from 0 to 14 points should be given individual examinations.

Camp Meade (November 1, 1918) and Camp Gordon (November 5, 1918) were both of the opinion that beta is not a satisfactory measure for negroes. The former holds that "too large a percentage of the negroes who should make high scores fail in beta." The latter submits data which indicate "that beta is poor at differentiating grades of intelligence of negroes in the low ranges."

Other camps are better satisfied with the standard beta as a test for negroes. Camp Dix (November 5, 1918) forwarded data which "show quite clearly that the intelligence of the negro recruit is measured quite as accurately as the intelligence of the white recruit of the same mentality." The same report holds that the group examinations are unsatisfactory for measurement of the lower grades of intelligence of both negroes and whites. This observation of course applies to a very much larger proportion of negroes than of whites and, as the report goes on to state, "the fact that 48.8 per cent of the negro beta subjects are rated as D− indicates the extent of the failure of the beta examination to adequately measure all the negroes."

Camp Travis (May 6, 1918) reported that beta is "a splendid examination for negroes. Every negro should be given beta." In the same report, however, beta is criticized on the ground that it "is more of an 'Aufgabe' test than a test of ability to work out problems that are understood." It is not stated to what degree this criticism applies to beta when used with negroes. Another report from Camp Travis (October 8, 1918) submits data which show that negroes and whites fail in individual examination in the same ratio that they fail in beta. "If the results of individual examinations are accepted as a satisfactory check, the group test appears to be as reliable in grading negroes as in grading whites." The percentage of negroes who failed in the group test was 50 per cent, that of the whites 4 per cent.

It appears definitely from camp reports that beta is unsatisfactory for use with negro drafts because its use results in such a large percentage of failures that they can not be recalled for individual examination. The need of a group test which will differentiate between the

different grades of low-grade mentality is clearly indicated. Whether or not the larger percentage of negro failures is due in part to a constitutional difference in their mentality is quite a different question, and one on which there is less agreement in camp reports. It will be taken up below when camp studies of the "qualitative" aspect of the negro's mentality are considered.

We turn now to the consideration of the quantitative aspect of the negro's intelligence. The chief mass of statistical data for a consideration of this question is, of course, the Hollerith principal sample. The method used in selecting the cases for this piece of statistical work, has been described in Part III, Chapter I, pages 573 to 657. The selection resulted in Groups IV and V, which are described in section 2 of chapter 1 and analyzed in tables 4 and 5. It will be seen there that Group IV is approximately a pro-rata selection by States, so that the entire group is geographically representative of the country at large. Group V is an additional group of northern negroes (Illinois, Indiana, New Jersey, New York, Pennsylvania), selected in order, for purposes of comparison of northern and southern negroes, to increase the northern group which on a pro-rata basis is small.

The negroes of Group IV, chosen to represent the negro male population of the country, when compared by percentage making a given letter grade with the total number of white cases similarly distributed, show at once a striking inferiority in intelligence of the colored recruits. The comparison is as follows:

Race.	Number of cases.	Percentage making grade.						
		D−.	D.	C−.	C.	C+.	B.	A.
Whites, Groups I, II, IV	93,973	7.0	17.1	23.8	25.0	15.0	8.0	4.1
Negroes, Group IV	18,891	49.0	29.7	12.9	5.7	2.0	0.6	0.1

In this connection it is significant to compare the percentages of negroes and whites receiving their final intelligence rating on alpha, beta, and individual examinations, respectively. The percentages are as follows:

Race.	Number of cases.	Alpha.	Beta (including alpha-beta).	All individuals.
Whites, Groups I, II, IV	93,973	71.8	24.7	3.5
Negroes, Group IV	18,891	30.1	65.6	4.3
Negroes, Group V	1,765	58.2	39.4	2.4

Under alpha are included cases taking alpha only, under beta those taking beta only, and, in addition, those recalled to beta because of low grade in alpha. The much larger percentage of negroes taking beta is especially significant when it is considered that all the negroes are native born, while a large percentage of the whites who go to beta do so because of foreign birth and language difficulty. It will be observed that the negroes of Group V from the five Northern States are about midway between the negroes of Group IV, represnting the whole country, in the percentages of cases, receiving their final grade on alpha and beta respectively. The relatively low percentage of individual examinations of negroes is due to camp procedure.

It has already been mentioned that the standard procedure for the negroes was often modified to meet the unusual situation. In some camps the number of failures in the group tests was so great that recalls were dispensed with altogether. Table 224 gives for Groups IV and V combined the number of men taking the group examinations who should have been recalled and who were not. The numbers in parentheses indicate the number of men who took alpha only, beta only, alpha then beta, but no individual examination, the total number who were given individual examinations, and the total number of men examined. The numbers not in parentheses give the number of men taking a given examination or examinations who rated D−, but were not recalled for further examination. The table of percentages gives the per-

centage of men taking alpha, beta, or alpha and beta who received a D− rating, but no further examination. In other words, these figures represent the percentage of men receiving their final rating on a group examination who should have been recalled for further examination. It will be observed that the percentages are large. In all 39.8 per cent of the men examined rated D− on group examination and were not recalled. Men recalled from alpha for beta numbered 1,216, and the total number of men given individual examinations was 825. This gives a total of 2,041 men who were recalled for further examination by reason of failure, or 8.6 per cent of the total number examined. In brief, then, about half of the negroes were rated D− on the group examinations, and of those so failing about one-fifth were recalled and four-fifths allowed to go without further examination.

TABLE 224.—*Number and percentage of negroes rating D − on group examinations who were not recalled for further examination (Groups IV and V).*

Camp.	Number.					Percentage.			
	Alpha only.	Beta only.	Alpha-beta.	Individual.	Total.	Alpha only.	Beta only.	Alpha-beta.	Total.
Custer	(855)	(799)	(157)	(25)	(1,836)	4.5	35.6	1.7	19.1
	37	285	27	.....	349				
Devens	(67)	(31)	(14)	(5)	(115)	1.5	11.9	.....	7.8
	1	8	.....	.....	9				
Dix	(1,372)	(1,371)	(1)	.....	(2,744)	42.4	52.6	100	47.4
	582	732	1	.....	1,315				
Dodge	(521)	(296)	(14)	.....	(831)	16.1	9.1	7.2	13.5
	84	27	1	.....	112				
Funston	(1,264)	(1,592)	(64)	.....	(2,920)	52.5	52.7	7.8	51.6
	664	840	5	.....	1,509				
Gordon	(327)	(1,769)	(65)	.....	(2,191)	63	51.8	15.8	52
	206	919	15	.....	1,140				
Grant	(884)	(1,084)	(226)	(74)	(2,268)	3.6	45.6	8.0	24
	32	495	18	.....	545				
Lewis	(68)	(29)	(15)	(6)	(118)	.....	.....	.....	.....
Meade	(188)	(1,816)	(45)	(219)	(2,268)	26.1	53.5	11	45.2
	59	972	5	.....	1,026				
Pike	(160)	(629)	(11)	(74)	(874)	36.2	48.0	9.1	42.1
	58	308	1	.....	367				
Taylor	(827)	(1,786)	(1)	(53)	(2,667)	25	64.1	100	51
	206	1,148	1	.....	1,355				
Travis	(410)	(296)	(374)	(295)	(1,375)	15.4	48	11.5	18.5
	63	142	43	.....	248				
Upton	(1,150)	(326)	(119)	(71)	(1,755)	3.3	13.5	1.0	4.8
	38	44	2	.....	84				
Wadsworth	(327)	(1,310)	.....	(5)	(1,642)	54	84.2	.....	78
	176	1,103	.....	.....	1,279				
All camps	(8,429)	(13,134)	(1,116)	(825)	(23,604)	26.1	53.5	9.8	39.8
	2,196	7,023	119	.....	9,338				

A comparative study of the negroes by camp was one of the objects of the Hollerith analysis. The results of the sortings are given in tables 225 to 244. These tables give the figures for Group IV and Group V and also for Groups IV and V combined. The results are given by letter grade in tables 245 and 246 for Groups IV and V, respectively. In each table the first column gives the number of cases and the following ones the percentage of this number making the different letter grades. The superiority of the camps of Group V over the corresponding camps of Group IV is at once apparent. Group V includes only northern negroes, Group IV the general run. When Group IV is considered alone, it seems that here the northern camps are somewhat superior to the southern ones in negro intelligence. If we compare the percentage distribution of each camp with the total percentage distribution, we may call a camp "better" if it has a larger percentage of superior and a smaller percentage of inferior men than the total, and "poorer" if the percentage of superior men is less than the total and the percentage of inferior men greater. If such comparisons are made, we find that Camps Custer, Devens, Dodge, Grant, Lewis, and Upton have distributions which may be considered "better" than the total distribution; Camps Taylor and Travis have distributions which approximately correspond to the total distribution; while Camps Dix, Funston, Gordon, Meade, Pike, and Wadsworth have distributions which may be considered "poorer" than the total distribution.

TABLE 225.—*Variables: Alpha score × camp. Group IV: Colored draft.*

For men who took alpha only.

Alpha score.	Camp.														Total.
	Custer.	Devens.	Dix.	Dodge.	Funston.	Gordon.	Grant.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	Wadsworth.	
165–169											1				1
160–164							1								1
155–159				1											1
150–154	2		1	2											5
145–149	1			1											2
140–144	1			1	1								1		4
135–139	2		1										1		4
130–134	1	1			1						2				5
125–129	2			3			3	4	1		1				14
120–124	2			2	1	1	1	1		1	2		2		13
115–119				3			2		1		3				9
110–114	5	1	3	4	1	1	1	4			3	1			24
105–109	5		1	1	2	1	2	1	1		2	1	3		20
100–104	3	1	4	8	7		3	1	3	1	5	2	3		41
95– 99	3	2	2	5	2		1	3	1	2	3	1	2	1	28
90– 94	5	2	4	3	4		3	2	6		4	3	2		38
85– 89	8	1	7	10	8	2	6	5	5	1	7	5	7		72
80– 84	7	2	7	12	7	1	9	4	3		8	6	5	2	73
75– 79	8	5	4	8	12	4	4	3	4		11	7	4	2	76
70– 74	11	2	8	14	12	2	6	4	6	1	11	6	7	2	92
65– 69	20	4	6	9	13	8	11	6	9	1	10	2	8		107
60– 64	11	5	7	15	18	2	12	2	6	4	20	6	9	2	119
55– 59	16	6	10	20	22	3	10	3	7	5	20	8	11	6	147
50– 54	19	6	22	32	28	2	10	1	8	4	24	9	12	4	181
45– 49	21	4	11	32	33	5	17	4	12	8	32	18	10	4	211
40– 44	24	6	25	30	44	7	17	4	15	6	32	18	15	17	260
35– 39	29	6	26	32	49	15	23	14	2	9	33	34	13	11	296
30– 34	27	6	28	43	67	13	23	2	22	12	56	36	19	14	368
25– 29	38	5	41	55	81	15	27		10	13	42	47	16	31	419
20– 24	33	1	64	50	76	17	36		17	9	59	55	22	28	467
15– 19	62		77	43	111	22	55			25	68	82	12	35	592
10– 14	7	1	106	35	145	36	10		11	23	63	8	8	52	505
5– 9	10		140	41	232	71	7		11	35	65	18	7	61	698
0– 4	2		215	8	287	99	6		27		52	37	2	53	788
Total	385	67	820	521	1,264	327	306	68	188	160	639	410	201	325	5,681

TABLE 226.—*Variables: Beta score × camp. Group IV: Colored draft.*

For men who took beta only.

Beta score.	Camp.														Total.
	Custer.	Devens.	Dix.	Dodge.	Funston.	Gordon.	Grant.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	Wadsworth.	
115–118			1												1
110–114						1			1						2
105–109												1			1
100–104	1					2			1			1			5
95– 99	2					1		1		1	2			1	7
90– 94	1		1			2					1	3		1	9
85– 89	1					5			6	1		3			16
80– 84	1		1	3	2	2		2	4		2	1			18
75– 79	1	1		2	2	8	2	2	9	5	8	1	1	2	44
70– 74	3		1	3	3	15	1		10	4	8	2	1		51
65– 69	1	1	2	6	6	17	7	3	21	7	11	3	2		87
60– 64	3	1	11	9	10	25	7	1	23	7	21	2	1	4	125
55– 59	8	1	15	8	14	32	9		21	7	33	6		5	159
50– 54	16		21	13	23	40	12	2	49	12	24	4	6	1	223
45– 49	21	3	21	19	55	50	14	2	55	15	37	8	7	7	314
40– 44	15	2	37	21	59	67	13	5	75	40	45	17	4	9	409
35– 39	27	1	29	38	91	103	24	4	93	35	63	12	2	14	536
30– 34	28	5	71	41	99	113	35	5	109	47	94	22	4	31	704
25– 29	49	3	103	58	176	154	45	3	154	71	121	32	15	51	1,035
20– 24	41	5	105	48	212	213	73		213	69	130	36	11	79	1,235
15– 19	39	2	136	22	267	263	88		274	86	199	43	12	139	1,570
10– 14	56	1	175	4	254	274	131		258	99	281	41	5	212	1,821
5– 9	32	3	166	1	201	249	113		235	77	304	36	1	313	1,731
0– 4	12	2	158		118	133	88		205	46	339	22	2	405	1,530
Total	358	31	1,054	296	1,592	1,769	662	29	1,816	629	1,723	296	74	1,304	11,633

TABLE 227.—*Variables: Beta score × camp. Group IV: Colored draft.*

For men who took beta only and alpha and beta only.

Beta score.	Camp.														Total.
	Custer.	Devens.	Dix.	Dodge.	Funston.	Gordon.	Grant.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	Wadsworth.	
115–118			1												1
110–114						1			1						2
105–109												1			1
100–104	1					2			1			1			5
95– 99	2					1		1		1	2			1	8
90– 94	1		1			3					1	5		1	12
85– 89	1					5		1	6	1		8			22
80– 84	1		1	3	2	2		2	4	1	2	6	1		25
75– 79	1	1		2	6	8	2	2	9	5	8	1	1	2	48
70– 74	3		1	3	3	15	1		10	4	8	8	1		57
65– 69	2	1	2	6	6	21	8	3	21	7	11	22	2		112
60– 64	3	1	11	10	10	30	9	3	24	8	21	18	2	4	154
55– 59	11	1	15	8	16	40	14	2	26	7	33	26	1	5	205
50– 54	17		21	14	34	40	17	4	53	13	24	32	11	1	281
45– 49	26	8	21	21	61	59	25	3	57	15	37	42	13	7	395
40– 44	17	4	37	23	64	76	30	8	81	41	45	54	6	9	495
35– 39	39	4	29	41	98	114	42	7	99	37	63	53	8	14	648
30– 34	30	7	71	43	107	127	70	5	115	48	94	66	10	31	824
25– 29	57	3	103	58	183	168	62	3	163	72	121	66	20	51	1,130
20– 24	49	7	105	50	221	218	83		214	71	130	76	14	79	1,317
15– 19	42	2	137	22	269	269	101		276	87	200	61	12	139	1,617
10– 14	58	1	175	5	256	278	132		260	99	281	56	5	242	1,848
5– 9	35	3	166	1	202	254	116		236	77	304	45	1	313	1,753
0– 4	13	2	158		118	133	88		205	46	339	23	2	405	1,532
Total	409	45	1,055	310	1,656	1,864	800	44	1,861	640	1,724	670	110	1,304	12,492

TABLE 228.—*Variables: Performance scale score × camp. Group IV: Colored draft.*

For all men who took performance scale examination.

Performance scale score.	Camp.					Total.
	Custer.	Grant.	Lewis.	Taylor.	Travis.	
150–159	1				1	2
140–149	1					1
130–139						
120–129	1					1
110–119						
100–109	2					2
90– 99		1				1
80– 89			2		1	3
70– 79				3	2	5
60– 69	3					3
50– 59	1			1	1	3
40– 49	1				1	2
30– 39	1			3	1	5
20– 29				1	2	3
10– 19					1	1
0– 9						
Total	11	1	2	8	10	32

TABLE 229.—*Variables: Point scale score × camp. Group IV: Colored draft.*

For all men who took point scale examination.

Point scale score.	Camp.						Total.
	Custer.	Meade.	Pike.	Taylor.	Travis.	Wadsworth.	
100							
95–99		1					1
90–94		1					1
85–89		2			1		3
80–84		4			2		6
75–79		5		1	3		9
70–74		12	1		15		28
65–69		14	2		16		32
60–64		22			25		47
55–59		18	3		19		40
50–54		28	2		36	5	71
45–49		10	5		26		41
40–44		15	2	1	17		35
35–39	12		8		3		23
30–34		7	6		2		15
25–29		5	2		3		10
20–24	1	1	2		22		26
15–29				1			1
10–14		1					1
5– 9							
0– 4							
Total	13	146	33	3	190	5	390

TABLE 230.—*Variables: Stanford-Binet mental age × camp. Group IV: Colored draft.*

For all men who took Stanford-Binet examination.

Stanford-Binet mental age.	Camp.									Total.
	Custer.	Devens.	Grant.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	
14.0–14.4					1					1
13.5–13.9										
13.0–13.4								2		2
12.5–12.9						1				1
12.0–12.4					1			2		3
11.5–11.9						1		1		2
11.0–11.4				1				3		4
10.5–10.9				1	4	4		3		12
10.0–10.4		1			9	3		5		18
9.5– 9.9			2		13	2	1	5	1	24
9.0– 9.4		2	4	2	8	8		22	9	55
8.5– 8.9			2		9	6	1	22		40
8.0– 8.4			2		11	11	5	13	2	44
7.5– 7.9			1		4	3	4	5		17
7.0– 7.4			4		5	1	14	5	3	32
6.5– 6.9			1		5		7	2		15
6.0– 6.4			4		2	1	6	1		14
5.5– 5.9	1		1				2			4
5.0– 5.4								3		3
4.5– 4.9							1			1
4.0– 4.4			1		1		1			3
3.5– 3.9								1		1
3.0– 3.4										
2.5– 2.9										
Total	1	3	22	4	73	41	42	95	15	296

TABLE 231.—*Variables: Alpha score × camp. Group IV: Colored draft.*

For men who took alpha only, alpha and beta, alpha and individual examination, and alpha, beta, and individual examination.

Alpha score.	Camp.														Total.
	Custer.	Devens.	Dix.	Dodge.	Funston.	Gordon.	Grant.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	Wadsworth.	
165–169											1				1
160–164							1								1
155–159				1											1
150–154	2		1	2											5
145–149	1			1											2
140–144	1			1	1								1		4
135–139	2		1										1		4
130–134	1	1			1						2				5
125–129	2			3			3	4	1		1				14
120–124	2			2	1	1	1	1		1	2		2		13
115–119				3			2		1		3				9
110–114	5	1	3	4	1	1	1	4			3	1			24
105–109	5		1	1	2	1	2	1	1		2	1	3		20
100–104	3	1	4	8	7		3	1	3	1	5	2	3		41
95– 99	3	2	2	5	2		1	3	1	2	3	1	2	1	28
90– 94	5	2	4	3	4		3	2	6		4	3	2		38
85– 89	8	1	7	10	8	2	6	5	5	1	7	5	7		72
80– 84	7	2	7	12	7	1	9	4	3		8	6	5	2	73
75– 79	8	5	11	8	12	4	4	3	4		11	7	4	2	76
70– 74	11	2	8	14	12	2	6	5	6	1	11	6	7	2	93
65– 69	20	4	7	9	13	8	12	6	9	1	10	2	5		109
60– 64	11	5	7	15	18	2	12	2	6	4	20	7	9	2	120
55– 59	16	6	10	20	22	3	10	4	7	5	20	8	11	6	143
50– 54	19	6	22	32	28	3	10	1	8	4	24	9	12	4	182
45– 49	21	4	11	32	33	7	17	5	12	9	32	19	10	4	216
40– 44	24	6	25	30	44	8	17	4	15	6	32	20	15	17	263
35– 39	29	6	26	32	49	18	23	14	2	9	33	34	13	11	299
30– 34	27	6	28	44	67	17	23	3	23	12	56	39	19	14	378
25– 29	38	5	41	53	82	20	27	3	13	13	42	47	16	31	431
20– 24	34	3	67	50	76	25	36	6	17	9	59	60	22	28	492
15– 19	62	3	77	63	111	22	56	2	9	25	68	87	12	35	632
10– 14	28	5	106	39	162	49	64	4	20	27	63	111	23	52	753
5– 9	35	4	140	44	251	88	64	2	29	38	66	154	25	61	1,001
0– 4	9	2	217	8	304	129	32	1	31	4	53	227	5	53	1,075
Total	439	82	826	549	1,318	411	445	90	232	172	641	856	237	325	6,623

TABLE 232.—*Variables: Beta score × camp. Group IV: Colored draft.*

For men who took beta only, alpha and beta, beta and individual examination, and alpha, beta, and alpha, beta, and individual examination.

Beta score.	Camp.														Total.
	Custer.	Devens.	Dix.	Dodge.	Funston.	Gordon.	Grant.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	Wadsworth.	
115–118			1												1
110–114						1			1						2
105–109												1			1
100–104	1					2			1			1			5
95– 99	2					1		1		1	2			1	8
90– 94	1		1			3					1	5		1	12
85– 89	1					5		1	6	1		8			22
80– 84	1		1	3	2	2		2	4	1	2	6	1		25
75– 79	1	1		2	6	8	2	2	9	5	8	1	1	2	48
70– 74	3		1	3	3	15	1		10	4	8	8	1		57
65– 69	2	1	2	6	6	21	8	3	21	7	11	22	2		112
60– 64	3	1	11	10	10	30	9	3	24	8	21	18	2	4	154
55– 59	11	1	15	8	16	40	14	2	26	7	33	26	1	5	205
50– 54	17		21	14	34	40	17	4	53	13	24	32	11	1	281
45– 49	26	8	21	21	61	59	25	3	57	15	37	42	13	7	395
40– 44	17	4	37	23	64	76	30	8	81	41	45	54	6	9	495
35– 39	39	4	29	41	98	114	42	7	99	37	63	54	8	14	649
30– 34	30	7	71	43	107	127	70	6	115	49	94	66	10	31	826
25– 29	57	3	103	58	183	168	63	4	164	72	121	69	20	51	1,136
20– 24	49	7	105	50	221	218	86	4	218	73	130	84	15	79	1,339
15– 19	42	3	137	22	269	270	105		311	96	200	89	19	140	1,703
10– 14	58	4	175	5	256	278	134		321	115	281	107	11	245	1,990
5– 9	35	11	166	1	202	254	118		278	102	307	137	2	314	1,927
0– 4	13	3	158		118	133	98		232	57	349	132	2	405	1,700
Total	409	58	1,055	310	1,656	1,865	822	50	2,031	704	1,737	962	125	1,309	13,093

TABLE 233.—*Variables: Alpha score × camp. Group V: Colored draft.*

For men who took alpha only.

Alpha score.	Camp.						Total.
	Custer.	Dix.	Grant.	Taylor.	Upton.	Wadsworth.	
180-184			1				1
175-179			2				2
170-174		1	1		1		3
165-169		1					1
160-164			2		4		6
155-159			2		1		3
150-154			1		1		2
145-149	1				2		3
140-144	1	1	4	1	4		11
135-139		1	3		1		5
130-134		2	4		3		9
125-129	1		3	1	9		14
120-124		2	3	2	9		16
115-119	1	6	7		8		22
110-114	5	9	7	3	9		30
105-109	6	6	7	2	14		35
100-104	5	3	5	2	6		21
95- 99	5	7	10	5	19		46
90- 94	7	6	6	1	15		35
85- 89	8	13	15	3	32	1	72
80- 84	13	12	18	6	22		68
75- 79	19	10	22	5	33		89
70- 74	17	12	18	6	32		85
65- 69	16	21	25	4	37		103
60- 64	23	17	33	6	34		113
55- 59	26	25	35	11	48		145
50- 54	28	26	39	13	64		170
45- 49	31	35	36	10	59		159
40- 44	33	31	52	13	62		191
35- 39	40	40	40	17	72		209
30- 34	49	31	48	17	86		231
25- 29	35	40	49	8	67		199
20- 24	44	30	33	14	86	1	208
15- 19	38	38	41	12	97		246
10- 14	6	33	5	11	7		62
5- 9	6	48	1	10	12		77
0- 4	6	49	3	5	2		56
Total	470	552	578	188	958	2	2,748

TABLE 234.—*Variables: Beta score × camp. Group V: Colored draft.*

For men who took beta only.

Beta score.	Camp.						Total.
	Custer.	Dix.	Grant.	Taylor.	Upton.	Wadsworth.	
100-104		1					1
95- 99							0
90- 94	2	1		1			4
85- 89	2						2
80- 84	1	2	1		1		5
75- 79	5	5	5	2			17
70- 74	1	3	5	1	3		13
65- 69	6	5	11	2	6		30
60- 64	8	10	19	3	5		45
55- 59	10	12	16	2	16		56
50- 54	18	16	29		8		71
45- 49	22	14	36	1	26		99
40- 44	37	30	39	4	28		119
35- 39	40	25	42	6	28		141
30- 34	36	28	51	4	40		159
25- 29	50	40	56	6	28	1	181
20- 24	54	38	46	6	39	1	187
15- 19	65	26	42	10	16	2	161
10- 14	39	31	14	5	6		95
5- 9	34	27	16	5	2		84
0- 4	8	13	3	5		2	31
Total	441	317	422	64	252	6	1,501

TABLE 235.—*Variables: Beta score × camp. Group V: Colored draft.*

For men who took beta only and alpha and beta only.

Beta score.	Camp.						Total.
	Custer.	Dix.	Grant.	Taylor.	Upton.	Wadsworth.	
100–104	.....	1	.....	.....	.....	.....	1
95– 99	.....	2	.....	.....	.....	.....	2
90– 94	2	1	.....	1	.....	.....	4
85– 89	2	.....	.....	.....	.....	.....	2
80– 84	2	2	1	.....	1	.....	6
75– 79	5	5	5	2	.....	.....	17
70– 74	2	3	5	1	3	.....	14
65– 69	7	5	13	2	12	.....	39
60– 64	13	10	20	3	14	.....	60
55– 59	17	12	21	2	25	.....	77
50– 54	30	16	38	.....	23	.....	107
45– 49	34	14	47	1	43	.....	139
40– 44	47	20	37	4	51	.....	159
35– 39	49	25	54	6	60	.....	194
30– 34	41	28	65	4	63	.....	201
25– 29	60	40	66	6	45	1	218
20– 24	72	38	62	6	49	1	228
15– 19	74	26	43	10	18	2	173
10– 14	45	31	14	5	6	.....	101
5– 9	37	27	16	5	2	.....	87
0– 4	8	13	3	5	.....	2	31
Total	547	319	510	63	415	6	1,860

TABLE 236.—*Variables: Stanford-Binet mental age × camp. Group V: Colored draft.*

For all men who took Stanford-Binet examination.

Stanford-Binet mental age.	Camp.		Total.
	Grant.	Upton.	
13.0–13.4	1	.....	1
12.5–12.9	1	.....	1
12.0–12.4	.....	.....	0
11.5–11.9	1	.....	1
11.0–11.4	2	.....	2
10.5–10.9	1	.....	1
10.0–10.4	3	2	5
9.5– 9.9	6	4	10
9.0– 9.4	8	34	42
8.5– 8.9	6	6	12
8.0– 8.4	7	4	11
7.5– 7.9	3	3	6
7.0– 7.4	7	1	8
6.5– 6.9	3	2	5
6.0– 6.4	1	.....	1
5.5– 5.9	1	.....	1
Total	51	56	107

TABLE 237.—*Variables: Alpha score × camp. Group V: Colored draft.*

For all men who took alpha only, alpha and beta only, alpha and individual examination, and alpha, beta, and individual examination.

Alpha score.	Camp.						Total.
	Custer.	Dix.	Grant.	Taylor.	Upton.	Wadsworth.	
180-184			1				1
175-179			2				2
170-174		1	1		1		3
165-169		1					1
160-164			2		4		6
155-159			2		1		3
150-154			1		1		2
145-149	1				2		3
140-144	1	1	4	1	4		11
135-139		1	3		1		5
130-134		2	4		3		9
125-129	1		3	1	9		14
120-124		2	3	2	9		16
115-119	1	6	7		8		22
110-114	6	6	7	3	9		31
105-109	6	6	7	2	14		35
100-104	5	3	5	2	6		21
95- 99	5	7	10	5	19		46
90- 94	7	6	6	1	15		35
85- 89	8	13	15	3	32	1	72
80- 84	13	12	15	6	22		68
75- 79	19	10	22	5	33		89
70- 74	18	12	18	6	32		86
65- 69	16	21	25	4	37		103
60- 64	23	17	33	6	34		113
55- 59	26	25	35	11	48		145
50- 54	28	26	39	13	64		170
45- 49	31	23	36	10	59		159
40- 44	33	31	52	13	62		191
35- 39	40	40	40	17	72		209
30- 34	50	31	48	17	86		232
25- 29	35	40	49	8	67		199
20- 24	44	30	33	14	86	1	208
15- 19	40	58	41	12	97		248
10- 14	52	33	52	11	88		236
5- 9	42	48	27	10	67		194
0- 4	25	40	47	5	2	1	120
Total	576	552	695	188	1,094	3	3,108

TABLE 238.—*Variables: Beta score × camp. Group V: Colored draft.*

For all men who took beta only, alpha and beta only, beta and individual examination, and alpha, beta, and individual examination.

Beta score.	Camp.						Total.
	Custer.	Dix.	Grant.	Taylor.	Upton.	Wadsworth.	
100-104		1					1
95- 99							0
90- 94	2	1		1			4
85- 89	2						2
80- 84	2	2	1		1		6
75- 79	5	5	5	2			17
70- 74	2	3	5	1	3		14
65- 69	7	5	14	2	12		40
60- 64	13	10	20	3	14		60
55- 59	17	12	21	2	25		77
50- 54	30	16	38		23		107
45- 49	34	14	47	1	43		139
40- 44	47	20	37	4	51		159
35- 39	49	25	55	6	60		195
30- 34	41	28	65	4	63		201
25- 29	60	40	67	6	45	1	219
20- 24	72	38	67	6	52	1	236
15- 19	74	28	51	10	40	2	203
10- 14	45	31	31	5	27		139
5- 9	37	27	29	5	11		109
0- 4	8	13	5	5	1	2	34
Total	547	317	558	63	471	6	1,962

TABLE 239.—*Variables: Alpha score × camp. Groups IV and V: Colored draft.*

For men who took alpha only.

Alpha score.	Camp.														Total.
	Custer.	Devens.	Dix.	Dodge.	Funston.	Gordon.	Grant.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	Wadsworth.	
180-184							1								1
175-179							2								2
170-174			1				1						1		3
165-169			1								1				2
160-164							3						4		7
155-159				1			2						1		4
150-154	2		1	2			1						1		7
145-149	2			1									2		5
140-144	2		1	1	1		1				1		5		15
135-139	2		2				3						2		9
130-134	1	1	2		1		4					2	3		14
125-129	3			3			6	4	1			2	9		28
120-124	2		2	2	1	1	4	1		1		4	11		29
115-119	1		6	3			9		1			3	8		31
110-114	10	1	9	4	1	1	8	4				6	1	9	54
105-109	11		7	1	2	1	9	1	1			4	1	17	55
100-104	8	1	7	8	7		8	1	3	1	7	2	9		62
95- 99	8	2	9	5	2		11	3	1	2	8	1	21	1	74
90- 94	12	2	10	3	4		9	2	6		5	3	17		78
85- 89	16	1	20	10	8	2	21	5	5	1	10	5	39	1	144
80- 84	20	2	19	12	7	1	24	4	3		14	6	27	2	141
75- 79	27	5	14	8	12	4	26	3	4		16	7	37	2	165
70- 74	28	2	20	14	12	2	24	4	6	1	17	6	39	2	177
65- 69	36	4	27	9	13	8	36	6	9	1	14	2	45		210
60- 64	34	5	24	15	18	2	45	2	6	4	26	6	43	2	232
55- 59	42	6	35	20	22	3	45	3	7	5	31	8	59	6	292
50- 54	47	6	48	32	28	2	49	1	8	4	37	9	76	4	351
45- 49	52	4	34	32	33	5	53	4	12	8	42	18	69	4	370
40- 44	57	6	56	30	44	7	69	4	15	6	45	18	77	17	451
35- 39	69	6	66	32	49	15	63	14	2	9	50	34	85	11	505
30- 34	76	6	59	43	67	13	71	2	22	12	73	36	105	14	599
25- 29	73	5	81	53	81	15	76		10	13	50	47	83	31	618
20- 24	77	1	94	50	76	17	69		17	9	73	55	108	29	675
15- 19	100		135	43	111	22	96			25	80	82	109	35	838
10- 14	13	1	139	35	145	36	15		11	23	74	8	15	52	567
5- 9	16		188	41	232	71	8		11	35	75	18	19	61	775
0- 4	8		255	8	287	99	9		27		57	37	4	53	844
Total	855	67	1,372	521	1,264	327	884	68	188	160	827	410	1,159	327	8,429

TABLE 240.—*Variables: Beta score × camp. Groups IV and V: Colored draft.*

For men who took beta only.

Beta score.	Camp.														Total.
	Custer.	Devens.	Dix.	Dodge.	Funston.	Gordon.	Grant.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	Wadsworth.	
115-118			1												1
110-114						1			1						2
105-109												1			1
100-104	1		1			2			1			1			6
95- 99	2					1				1	2			1	7
90- 94	3		2			2					2	3		1	13
85- 89	3					5			6	1		3			18
80- 84	2		3	3	2	2	1	2	4		2	1	1		23
75- 79	6	1	5	2	2	8	7	2	9	5	10	1	1	2	61
70- 74	1		1	3	3	15	6		10	4	9	2	4		64
65- 69	7	1	7	6	6	17	18	3	21	7	13	3	8		117
60- 64	11	1	21	9	10	25	26	1	23	7	24	2	6	4	170
55- 59	13	1	27	8	14	32	25		21	7	35	6	16	5	215
50- 54	34		37	13	23	40	41	2	49	12	24	4	14	1	294
45- 49	43	3	35	19	55	50	50	2	55	15	38	8	33	7	413
40- 44	52	2	57	21	59	67	43	5	75	40	49	17	32	9	528
35- 39	67	1	54	38	91	103	66	4	93	35	69	12	30	14	677
30- 34	64	5	99	41	99	113	86	5	109	47	98	22	44	31	863
25- 29	90	3	143	58	176	154	101	3	154	71	127	32	43	52	1,216
20- 24	98	5	143	48	212	213	119		213	69	136	36	50	80	1,422
15- 19	104	2	162	22	267	263	130		274	86	209	43	28	141	1,731
10- 14	95	1	206	4	254	274	145		258	99	286	41	11	212	1,916
5- 9	66	3	1[illegible]	1	291	249	129		235	77	309	36	3	313	1,815
0- 4	20	2	171		118	133	91		205	46	344	22	2	407	1,561
Total	799	31	1,371	296	1,592	1,799	1,084	29	1,816	629	1,786	296	326	1,310	13,134

TABLE 241.—*Variables: Beta score × camp. Groups IV and V: Colored draft.*

For men who took beta only and alpha and beta only.

Beta score.	Camp.														Total.
	Custer.	Devens.	Dix.	Dodge.	Funston.	Gordon.	Grant.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	Wadsworth.	
115-118	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
110-114	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....	2
105-109	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1
100-104	1	.....	1	.....	.....	2	.....	.....	1	.....	.....	1	.....	.....	6
95- 99	2	.....	.....	.....	.....	1	.....	1	.....	1	2	.....	.....	1	8
90- 94	3	.....	2	.....	.....	3	.....	.....	.....	.....	2	5	.....	1	16
85- 89	3	.....	.....	.....	.....	5	.....	1	6	1	.....	8	.....	.....	24
80- 84	3	.....	3	3	2	2	1	2	4	1	2	6	2	.....	31
75- 79	6	1	5	2	6	8	7	2	9	5	10	1	1	2	64
70- 74	5	.....	4	3	3	15	6	.....	10	4	9	8	4	.....	71
65- 69	9	1	7	6	6	21	21	3	21	7	13	22	14	.....	151
60- 64	16	1	21	10	10	30	29	3	24	8	24	18	16	4	214
55- 59	28	1	27	8	16	40	35	2	26	7	35	26	26	5	282
50- 54	47	.....	37	14	34	40	55	4	53	13	24	32	34	1	388
45- 49	60	8	35	21	61	59	72	3	57	15	38	42	56	7	534
40- 44	64	4	57	23	64	76	67	8	81	41	49	54	57	9	654
35- 39	88	4	54	41	98	114	96	7	99	37	69	53	68	14	842
30- 34	71	7	99	43	107	127	135	5	115	48	98	66	73	31	1,025
25- 29	117	3	143	58	183	168	128	3	163	72	127	66	65	52	1,348
20- 24	121	7	143	50	221	218	145	.....	214	71	136	76	63	80	1,545
15- 19	116	2	163	22	269	269	144	.....	276	87	210	61	30	141	1,790
10- 14	103	1	206	5	258	278	146	.....	260	99	286	56	11	242	1,949
5- 9	72	3	193	1	202	254	132	.....	236	77	309	45	3	313	1,840
0- 4	21	2	171	.....	118	133	91	.....	205	46	344	23	2	407	1,563
Total	956	45	1,372	310	1,656	1,864	1,310	44	1,861	640	1,787	670	525	1,310	14,350

TABLE 242.—*Variables: Stanford-Binet mental age × camp. Groups IV and V: Colored draft.*

For all men who took Stanford-Binet examination.

Stanford-Binet Mental Age.	Camp.									Total.
	Custer.	Devens.	Grant.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	
14.0-14.4	.....	.....	.....	.....	1	.....	.....	.....	.....	1
13.5-13.9	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
13.0-13.4	.....	.....	1	.....	.....	.....	.....	2	.....	3
12.5-12.9	.....	.....	1	.....	.....	1	.....	.....	.....	2
12.0-12.4	.....	.....	.....	.....	1	.....	.....	2	.....	3
11.5-11.9	.....	.....	1	.....	.....	1	.....	1	.....	3
11.0-11.4	.....	.....	2	1	.....	.....	.....	3	.....	6
10.5-10.9	.....	.....	1	1	4	4	.....	3	.....	13
10.0-10.4	.....	1	3	.....	9	3	.....	5	2	23
9.5- 9.9	.....	.....	8	.....	13	2	1	5	5	34
9.0- 9.4	.....	2	12	2	8	8	.....	22	43	97
8.5- 8.9	.....	.....	8	.....	9	6	1	22	6	52
8.0- 8.4	.....	.....	9	.....	11	11	5	13	6	55
7.5- 7.9	.....	.....	4	.....	4	3	4	5	3	23
7.0- 7.4	.....	.....	11	.....	5	1	14	5	4	40
6.5- 6.9	.....	.....	4	.....	5	.....	7	2	2	20
6.0- 6.4	.....	.....	5	.....	2	1	6	1	.....	15
5.5- 5.9	1	.....	2	.....	.....	.....	2	.....	.....	5
5.0- 5.4	.....	.....	.....	.....	.....	.....	.....	3	.....	3
4.5- 4.9	.....	.....	.....	.....	.....	.....	1	.....	.....	1
4.0- 4.4	.....	.....	1	.....	1	.....	1	.....	.....	3
3.5- 3.9	.....	.....	.....	.....	.....	.....	.....	1	.....	1
Total	1	3	73	4	73	41	42	95	71	403

TABLE 243.—*Variables: Alpha score × camp. Groups IV and V: Colored draft.*

For men who took alpha only, alpha and beta only, alpha and individual examination, and alpha, beta, and individual examination.

Alpha score.	Camp.														Total.
	Custer.	Devens.	Dix.	Dodge.	Funston.	Gordon.	Grant.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	Wadsworth.	
180–184							1								1
175–179							2								2
170–174			1				1						1		3
165–169			1								1				2
160–164							3						4		7
155–159				1			2						1		4
150–154	2		1	2			1						1		7
145–149	2			1									2		5
140–144	2		1	1	1		4				1		5		15
135–139	2		2				3						2		9
130–134	1	1	2		1		4				2		3		14
125–129	3			3			6	4	1		2		9		28
120–124	2		2	2	1	1	4	1		1	4		11		29
115–119	1		6	3			9		1		3		8		31
110–114	11	1	9	4	1	1	8	4			6	1	9		55
105–109	11		7	1	[illegible]	1	[illegible]	1	1		4	1	17		55
100–104	8	1	7	8	7		8	1	3	1	7	2	9		62
95– 99	8	2	9	5	2		11	3	1	2	8	1	21	1	74
90– 94	12	2	10	3	4		9	2	6		5	3	17		73
85– 89	16	1	20	10	8	2	21	5	5	1	10	5	39	1	144
80– 84	20	2	19	12	7	1	24	4	3		14	6	27	2	141
75– 79	27	5	14	8	12	4	26	3	4		16	7	37	2	165
70– 74	29	2	20	14	12	2	24	5	6	1	17	6	39	2	179
65– 69	36	4	28	9	13	8	37	6	9	1	14	2	45		212
60– 64	34	5	24	15	18	2	45	2	6	4	26	7	43	2	233
55– 59	42	6	35	20	22	3	45	4	7	5	31	8	59	6	293
50– 54	47	6	48	32	28	3	49	1	8	4	37	9	76	4	352
45– 49	52	4	34	32	33	7	53	5	12	9	42	19	69	4	375
40– 44	57	6	56	30	44	8	69	4	15	6	45	20	77	17	454
35– 39	69	6	66	32	49	18	63	14	2	9	50	34	85	11	508
30– 34	77	6	59	44	67	17	71	3	23	12	73	39	105	14	610
25– 29	73	5	81	53	82	20	76	3	13	13	50	47	83	31	630
20– 24	78	3	97	50	76	25	69	6	17	9	73	60	108	29	700
15– 19	102	3	135	63	111	22	97	2	9	25	80	87	109	35	880
10– 14	80	5	139	39	162	49	116	4	20	27	74	111	111	52	989
5– 9	77	4	188	44	251	88	91	2	29	38	76	154	92	61	1,195
0– 4	34	2	257	8	304	129	79	1	31	4	58	227	7	54	1,195
Total	1,015	82	1,378	549	1,318	411	1,140	90	232	172	829	856	1,331	328	9,731

TABLE 244.—*Variables: Beta score × camp: Groups IV and V: Colored draft.*

For all men who took beta only, alpha and beta only, beta and individual examination, and alpha, beta, and individual examination.

Beta score.	Camp.														Total.
	Custer.	Devens.	Dix.	Dodge.	Funston.	Gordon.	Grant.	Lewis.	Meade.	Pike.	Taylor.	Travis.	Upton.	Wadsworth.	
115–118			1												1
110–114						1			1						2
105–109												1			1
100–104	1		1			2			1			1			6
95– 99	2					1		1		1	2			1	8
90– 94	3		2			3					2	5		1	16
85– 89	3					5		1	6	1		8			24
80– 84	3		3	3	2	2	1	2	4	1	2	6	2		31
75– 79	6	1	5	2	6	8	7	2	9	5	10	1	1	2	65
70– 74	5		4	3	3	15	6		10	4	9	8	4		71
65– 69	9	1	7	6	6	21	22	3	21	7	13	22	14		152
60– 64	16	1	21	10	10	30	29	3	24	8	24	18	16	4	214
55– 59	28	1	27	8	16	40	35	2	26	7	35	26	26	5	282
50– 54	47		37	14	34	40	55	4	53	13	24	32	34	1	388
45– 49	60	8	35	21	61	59	72	3	57	15	38	42	56	7	534
40– 44	64	4	57	23	64	76	67	8	81	41	49	54	57	9	654
35– 39	88	4	54	41	98	114	97	7	99	37	69	54	68	14	844
30– 34	71	7	99	43	107	127	135	6	115	49	98	66	73	31	1,027
25– 29	117	3	143	58	183	168	130	4	164	72	127	69	65	52	1,355
20– 24	121	7	143	50	221	218	153	4	218	73	136	84	67	80	1,575
15– 19	116	3	163	22	269	270	156		311	96	210	89	59	142	1,906
10– 14	103	4	206	5	256	278	165		321	115	286	107	38	245	2,129
5– 9	72	11	193	1	202	254	147		278	102	312	137	13	314	2,036
0– 4	21	3	171		118	133	103		232	57	354	132	3	407	1,734
Total	956	58	1,372	310	1,656	1,865	1,380	50	2,031	704	1,800	962	596	1,315	15,055

TABLE 245.—*Percentage distribution of letter grades by camp. Group IV: Negroes.*

Camp.	Number of cases.	D−.	D.	C−.	C.	C+.	B.	A.
Custer	819	22.8	35.5	21.5	12.7	4.4	2.2	0.9
Devens	114	9.6	22.8	28.9	25.4	11.4	1.8	.....
Dix	1,875	58.5	25.9	10.0	3.6	1.5	0.3	0.2
Dodge	831	13.5	37.0	25.4	16.0	5.9	1.6	0.6
Funston	2,920	51.6	29.4	12.4	4.8	1.4	0.2	0.0
Gordon	2,191	52.0	33.9	10.0	3.1	0.6	0.3	0.1
Grant	1,129	42.5	33.8	13.7	6.8	2.3	0.8	0.1
Lee	.....	.....	.....	.....	.....	.....	.....	.....
Lewis	118	3.4	20.2	28.0	21.1	17.8	9.4	.....
Meade	2,268	51.0	33.1	10.0	4.2	1.5	0.2	0.1
Pike	874	49.0	35.9	9.8	4.5	0.7	0.2	.....
Taylor	2,416	56.5	23.8	11.5	5.9	1.6	0.7	0.1
Travis	1,375	33.4	36.8	20.2	6.2	2.8	0.5	0.1
Upton	326	15.6	28.5	27.6	18.7	7.4	1.5	0.6
Wadsworth	1,634	77.7	15.1	5.5	1.2	.3	.1	.....
Total	18,890	49.0	29.7	12.9	5.7	2.0	0.6	0.1

TABLE 246.—*Percentage distribution of letter grades by camp. Group V: Negroes.*

Camp.	Number of cases.	D−.	D.	C−.	C.	C+.	B.	A.
Custer	1,017	17.9	34.6	24.7	15.3	6.0	1.5	0.2
Dix	869	25.1	27.5	22.3	15.8	6.1	2.6	0.6
Grant	1,139	10.6	32.3	28.0	18.5	6.5	2.7	1.4
Taylor	251	20.3	20.7	24.3	21.9	8.8	3.6	0.4
Upton	1,429	6.8	32.0	27.4	20.2	9.0	3.6	1.0
Total	4,705	14.2	31.1	25.9	18.0	7.2	2.8	0.8

A graphic comparison by camps of percentages of superior and inferior negroes with percentages of superior and inferior whites is given in figure 20. The data for this chart on the whites are taken from table 199, of chapter 4, those on the negroes from table 245, which includes only the negroes of Group IV. If the camps are compared with the result for all camps, it appears that there is a fair correspondence between the camps which are "better" and "poorer" in negro intelligence and those which may be similarly designated as "better" and "poorer" in white intelligence. Camps Funston and Taylor, however, are relatively somewhat better and Upton and Dodge relatively somewhat poorer in white than in negro intelligence. The small number of cases of camps Lewis and Devens makes the comparisons in which they are involved somewhat doubtful. It should also be remembered that the cases of Group IV were selected to represent the negro population by State and not the negro draft by camp. Thus the number of cases in a given camp is not necessarily proportional to the number of negroes in that camp. Incidentally it should be noted that owing to the fact that the negro draft quotas were shifted around a great deal it is not certain that the negroes and whites of any given camp were drawn from the same localities. It will also be remembered here that a large part of the inferior negroes are men who made D− on group examination and who were not recalled. If they had been recalled and reexamined the percentages of inferior men would presumably have been somewhat lower.

Hollerith sortings were also made with the purpose of studying negro intelligence by State. The method of selection of the cases has already been described, and attention has been called to the great variation in the number of cases in the different States. Table 247 gives the percentage letter-grade distribution by State for the negroes of Group IV. The results of the Hollerith sortings are given in tables 248 to 267. In Group IV the tables have been cut down by the elimination of 24 States which had less than 100 cases. Table 247, which includes all the States, shows how atypical the distributions are in some cases where the number of cases is small. The percentage distributions for the five northern States which constitute Group V will be found in table 268. Comparing the distributions of this table with those of the corresponding States of Group IV, it appears that the distributions by letter grade for the different States is approximately the same for the two groups.

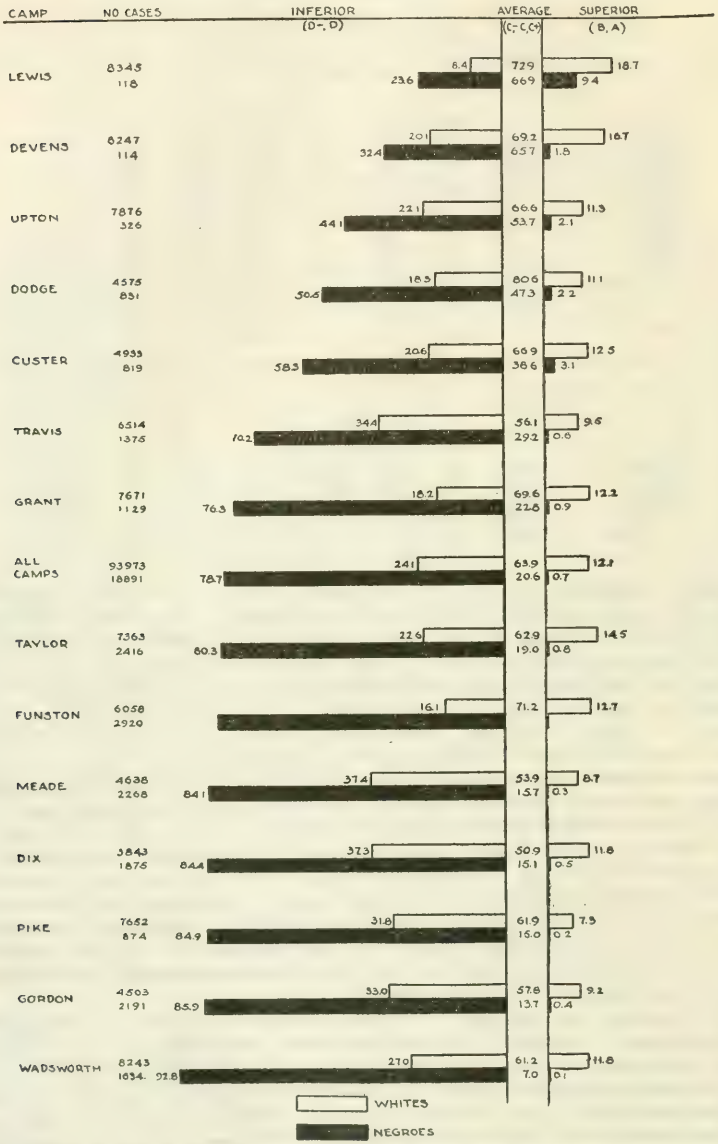

FIG. 20. Comparison of negroes and whites by camp according to percentage of individuals making inferior and superior grades.

TABLE 247.—*Percentage distribution of letter grades by State. Group IV: Negroes.*

State.	Number of cases.	D−.	D.	C−.	C.	C+.	B.	A.
Alabama	1,342	67.6	20.8	7.4	3.2	0.7	0.2	0.1
Arizona	42	66.6	21.4	4.8	4.8	2.4	.....	.....
Arkansas	841	49.1	35.3	10.0	4.6	0.7	0.1	.....
California	45	2.2	26.6	17.8	24.4	15.6	13.3	.....
Colorado	22	9.1	9.1	27.2	13.6	27.2	13.6	.....
Connecticut	34	32.4	32.4	11.8	17.6	5.9	.....	.....
Delaware	67	13.4	40.4	26.9	17.9	.....	1.5	.....
District of Columbia	186	38.7	38.7	15.6	5.4	1.6	.....	.....
Florida	621	68.2	16.4	8.8	5.2	1.0	0.3	.....
Georgia	2,187	51.9	33.9	10.4	2.9	0.6	0.3	0.1
Idaho	9	55.5	33.4	.....	11.1	.....	.....	.....
Illinois	223	16.6	33.6	19.7	19.7	8.1	1.8	0.4
Indiana	125	5.6	36.8	24.8	20.0	9.6	2.4	0.8
Iowa	32	6.2	21.9	28.1	25.0	9.4	6.2	3.1
Kansas	126	20.6	27.0	23.8	21.4	5.6	0.8	0.8
Kentucky	535	48.2	26.3	14.0	8.0	2.1	1.3	.....
Louisiana	1,398	55.3	28.9	11.2	3.4	0.9	0.4	.....
Maine	39	77.0	23.0	.....	.....	.....	.....	.....
Maryland	414	35.5	39.4	15.4	7.0	2.4	0.5	.....
Massachusetts	83	8.4	21.7	30.1	26.5	10.8	2.4	.....
Michigan	40	10.0	45.0	25.0	15.0	5.0	.....	.....
Minnesota	16	6.3	37.4	31.2	12.5	.....	12.5	.....
Mississippi	1,919	57.1	30.2	9.2	2.8	0.8	.....	.....
Missouri	320	16.5	38.1	27.5	12.5	4.4	1.2	.....
Montana	3	.....	66.6	.....	.....	.....	33.3	.....
Nebraska	18	11.1	22.2	50.0	11.1	5.5	.....	.....
Nevada	3	33.3	66.6	.....	.....	.....	.....	.....
New Hampshire	1	100.0	.....	.....	.....	.....	.....	.....
New Jersey	174	29.4	27.0	23.0	10.3	9.8	0.0	0.6
New Mexico	9	.....	22.2	11.1	.....	.....	11.1	55.5
New York	252	13.5	25.8	27.8	19.0	11.1	2.0	0.8
North Carolina	1,380	57.0	32.3	8.1	1.5	0.4	0.1	0.3
North Dakota	3	.....	33.3	.....	66.6	.....	.....	.....
Ohio	229	10.5	23.1	26.2	21.8	10.9	4.8	2.6
Oklahoma	288	55.5	13.9	9.7	18.7	1.4	0.7	.....
Oregon	4	.....	.....	50.0	.....	25.0	25.0	.....
Pennsylvania	379	22.4	36.6	22.1	11.4	4.2	2.9	0.5
Rhode Island	17	41.1	11.8	11.8	23.5	11.8	.....	.....
South Carolina	1,642	77.7	15.0	5.5	1.2	0.3	0.1	.....
South Dakota	2	.....	50.0	50.0	.....	.....	.....	.....
Tennessee	932	29.8	30.9	21.8	12.0	4.5	0.6	0.3
Texas	1,352	32.2	37.0	21.2	6.6	2.4	0.4	0.1
Utah	3	.....	66.6	.....	.....	33.3	.....	.....
Vermont	.....	.....	.....	.....	.....	.....	.....	.....
Virginia	1,328	45.5	30.9	9.3	3.6	1.3	0.2	0.1
Washington	15	.....	20.0	20.0	33.4	26.6	.....	.....
West Virginia	148	39.8	37.8	14.9	7.4	.....	.....	.....
Wisconsin	8	25.0	25.0	12.5	12.5	12.5	12.5	.....
Wyoming	10	50.0	10.0	20.0	20.0	.....	.....	.....
Total	18,866	49.0	29.7	12.9	5.7	2.0	0.6	0.2

TABLE 248.—*Variables: Alpha score × State. Group IV: Colored draft.*
For all men who took alpha only.

Alpha score.	State.																								Total.
	Alabama.	Arkansas.	District of Columbia.	Florida.	Georgia.	Illinois.	Indiana.	Kansas.	Kentucky.	Louisiana.	Maryland.	Mississippi.	Missouri.	New Jersey.	New York.	North Carolina.	Ohio.	Oklahoma.	Pennsylvania.	South Carolina.	Tennessee.	Texas.	Virginia.	West Virginia.	
160–164	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1
155–159	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	2	...	...	...	1	...	...	...	1
150–154	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	1	...	...	...	5
145–149	...	...	...	...	...	...	...	1	...	...	...	...	...	...	1	...	1	...	...	...	1	...	...	...	1
140–144	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	...	2	...	...	...	...	...	...	...	4
135–139	...	...	...	...	...	...	...	...	1	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	4
130–134	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	1	...	...	...	...	...	4
125–129	...	...	...	...	...	2	1	...	...	...	1	1	...	1	...	...	2	...	1	...	...	...	...	...	9
120–124	...	...	...	...	1	1	1	...	1	...	...	...	1	...	2	...	3	...	...	...	1	...	...	...	11
115–119	...	...	...	...	...	...	...	...	3	3	...	...	...	...	...	...	...	...	...	...	1	...	1	...	8
110–114	...	...	...	1	1	...	1	...	1	1	...	...	1	...	...	1	3	1	3	...	2	1	...	...	17
105–109	1	...	...	1	1	1	...	1	1	1	1	...	...	...	2	...	2	1	5	...	...	...	...	...	18
100–104	1	1	...	2	...	...	3	2	2	4	...	2	1	1	3	1	3	1	2	...	4	2	3	...	38
95– 99	...	2	...	...	...	1	...	...	...	...	...	1	1	1	3	...	5	...	1	1	4	1	1	...	22
90– 94	3	...	...	...	2	1	2	1	1	4	2	...	4	2	...	...	...	...	3	...	4	3	2	...	34
85– 89	1	1	1	2	2	4	3	...	1	3	2	3	4	5	7	...	6	1	3	...	9	5	2	...	65
80– 84	3	...	...	2	1	8	2	...	3	2	1	4	2	4	8	1	4	2	3	2	7	1	2	...	62
75– 79	1	...	...	...	4	3	1	2	2	2	2	3	6	1	4	3	6	...	3	2	13	7	2	...	67
70– 74	6	1	2	1	2	5	5	5	3	2	2	3	3	2	7	3	3	2	7	2	8	6	2	1	83
65– 69	6	1	...	3	6	7	3	2	2	7	5	5	3	...	7	3	9	2	8	...	7	2	4	1	93
60– 64	4	4	1	4	2	10	2	2	6	4	3	6	6	2	7	1	10	3	4	2	16	6	2	...	107
55– 59	6	5	...	7	4	4	3	7	7	7	2	9	6	4	6	1	8	4	7	6	10	8	3	4	128
50– 54	7	4	2	11	2	4	5	4	9	9	5	12	9	5	9	6	5	8	4	4	29	9	1	5	168
45– 49	11	8	2	6	5	10	5	6	9	12	6	12	10	3	8	2	7	4	10	4	30	18	4	2	194
40– 44	12	6	2	9	7	6	4	2	5	19	6	21	13	11	13	6	12	6	9	17	24	26	6	3	245
35– 39	12	9	2	11	17	7	3	5	9	19	9	22	11	8	9	5	10	9	14	11	31	34	2	5	278
30– 34	18	12	4	8	13	7	8	7	15	28	9	36	15	2	14	15	9	6	11	14	46	36	9	8	346
25– 29	24	17	1	21	15	13	7	7	19	57	7	41	18	4	16	16	6	8	15	31	52	47	2	7	408
20– 24	19	9	3	33	17	8	5	8	21	58	11	43	15	9	20	22	12	9	13	28	53	55	2	6	459
15– 19	41	25	2	42	22	11	7	11	19	33	10	37	17	9	10	37	13	5	18	35	50	82	3	9	586
10– 14	30	22	...	67	56	5	1	4	18	31	10	100	7	7	7	62	8	8	3	51	38	8	1	3	502
5– 9	28	55	...	93	62	3	1	4	21	60	10	102	11	12	6	82	4	7	4	73	48	18	1	3	694
0– 4	8	22	...	170	90	3	1	2	21	67	2	45	7	8	1	4	1	...	1	53	12	37	1	...	786
Total	262	181	22	499	319	126	74	85	194	401	109	765	167	103	171	210	153	87	19	344	502	412	56	57	5,448

TABLE 249.—*Variables: Beta score × State. Group IV: Colored draft.*

For all men who took beta only.

Beta score.	State.																								Total.
	Alabama.	Arkansas.	District of Columbia.	Florida.	Georgia.	Illinois.	Indiana.	Kansas.	Kentucky.	Louisiana.	Maryland.	Mississippi.	Missouri.	New Jersey.	New York.	North Carolina.	Ohio.	Oklahoma.	Pennsylvania.	South Carolina.	Tennessee.	Texas.	Virginia.	West Virginia.	
115-118																1									1
110-114					1																		1		2
105-109																						1			1
100-104					2											1			1			1			5
95- 99	1	1			1														1	1	1				6
90- 94					2											1	1			1	1	3			9
85- 89		1			5						1						1					3	4		15
80- 84					1		2	1	2			1		1		1			1		1	1	2		14
75- 79	2	5			8				3	2		2			1		3	2		2	1	1	9		41
70- 74		4	2		15	1	1		2		2	1	2	1	1	1	1	3	1		3	2	5		48
65- 69	1	7	1		17	3	1	1	2	4	4	4	1	1	2	3	2	2	1		8	3	14		82
60- 64	5	7	4		25	1	1	1	6	6	4	5	4	7	1	7	3	7	2	4	8	2	12		122
55- 59	6	7	4	1	32	3	1	1	13	7	1	7	5	6	1	11	3	4	6	5	12	5	13	1	155
50- 54	11	12	2	1	40	2	1	1	6	12	8	13	6	2	3	23	6	5	9	1	12	4	33	1	214
45- 49	10	15	6		50	4	6	4	10	14	10	34	12		4	27	8	6	15	7	18	8	32	1	301
40- 44	16	39	9	1	67	9	4	2	14	5	12	38	15	6	2	34	4	14	8	9	20	17	49	3	397
35- 39	33	35	13		104	8	9	4	9	26	19	65	10	1	1	46	3	24	15	14	27	12	43	6	527
30- 34	41	45	6	2	113	11	10	3	24	37	14	71	10	5	2	85	5	25	19	31	34	22	68	5	688
25- 29	58	68	13	8	154	9	8	4	24	54	25	141	12	8	7	112	4	44	25	51	51	32	91	11	1,014
20- 24	65	67	18	16	212	11	3	1	26	95	47	157	21	8	6	114	5	31	19	79	52	37	114	11	1,215
15- 19	112	83	37		261	11	2	1	43	128	43	205	9	9	8	158	5	20	21	139	49	43	162	11	1,560
10- 14	194	98	11	26	275	6	1	1	52	175	31	195	5	9	3	184	3	3	25	241	43	41	171	23	1,816
5- 9	219	76	11	26	249	4		1	45	169	29	130	10	2	1	168	5	1	20	313	41	36	164	7	1,727
0- 4	269	44	5	41	133	3	1		41	125	12	77	2	3	2	141	1		7	405	33	22	160	1	1,528
Total	1,043	614	142	122	1,767	86	51	26	322	859	262	1.146	124	69	45	1,118	65	189	196	1,303	415	296	1,147	81	11,488

TABLE 250.—*Variables: Beta score × State. Group IV: Colored draft.*

For all men who took alpha only and alpha and beta only.

Beta score.	State.																								Total.
	Alabama.	Arkansas.	District of Columbia.	Florida.	Georgia.	Illinois.	Indiana.	Kansas.	Kentucky.	Louisiana.	Maryland.	Mississippi.	Missouri.	New Jersey.	New York.	North Carolina.	Ohio.	Oklahoma.	Pennsylvania.	South Carolina.	Tennessee.	Texas.	Virginia.	West Virginia.	
115-118																1									1
110-114					1																		1		2
105-109																						1			1
100-104					2											1			1			1			5
95- 99	1	1			1															1	1				6
90- 94					3											1	1			1	1	5			12
85- 89		1	1		5						1						1					8	4		21
80- 84		1			1		2	1	2			1		1	1	1			1		1	6	2		21
75- 79	2	5			8				3	2		2			1		3	2		2	1	5	9		45
70- 74		4	2		15	1	1		2		2	1	2	1	1	1	3	1	1		3	8	5		54
65- 69	1	7	1		21	3	1	1	2	5	4	4	1	1	2	3	2	2	2		8	22	14		107
60- 64	5	8	4		30	1	1	1	6	8	5	5	4	7	2	7	3	8	2	4	8	18	12		149
55- 59	7	7	6	1	40	4	1	2	13	11	4	7	5	6	2	11	4	4	6	5	12	25	13	1	197
50- 54	11	13	3	1	46	2	1	1	6	17	11	13	[illegible]	2	5	23	6	6	10	1	12	32	33	1	265
45- 49	10	15	7		59	4	6	4	10	27	11	35	15		9	27	10	7	17	7	18	42	32	2	374
40- 44	17	40	9	1	76	11	4	2	14	20	18	39	19	6	3	34	5	16	9	9	20	53	49	3	477
35- 39	34	37	14		115	10	[illegible]	4	9	42	24	65	17	1	6	46	7	26	18	14	28	53	43	9	631
30- 34	41	46	7	2	127	13	10	4	24	72	19	71	15	5	5	85	5	26	19	31	34	66	68	7	802
25- 29	59	69	14	8	168	10	8	4	24	72	33	144	13	8	12	112	4	44	31	51	51	66	91	12	1,108
20- 24	68	69	19	16	217	12	3	1	26	106	47	159	26	8	8	114	7	33	21	79	52	76	114	12	1,293
15- 19	113	84	37		267	13	2	1	43	139	45	205	10	10	8	158	6	20	21	139	50	61	162	12	1,606
10- 14	195	98	11	26	279	6	1	1	52	177	33	196	5	9	3	184	3	4	26	241	43	56	171	23	1,843
5- 9	219	76	11	26	254	4		1	45	173	30	130	10	2	1	168	5	1	22	313	41	45	164	8	1,749
0- 4	269	44	5	41	133	3	1		41	125	12	77	2	3	2	141	1		8	405	33	23	160	1	1,530
Total	1,052	625	151	122	1,868	97	51	28	322	996	299	1,154	153	70	71	1,118	76	200	216	1,303	417	672	1,147	91	12,299

TABLE 251.—*Variables: Performance scale score × State. Group IV: Colored draft.*

For all men who took performance scale examination.

Performance scale score.	State.						Total.
	Kentucky.	Louisiana.	New Jersey.	Ohio.	Tennessee.	Texas.	
150–159						1	1
140–149							0
130–139							0
120–129							0
110–119							0
100–109			1				1
90– 99		1					1
80– 89						1	1
70– 79					3	2	5
60– 69							0
50– 59				1		1	2
40– 49						1	1
30– 39	1				2	1	4
20– 29					1	2	3
10– 19						1	1
Total	1	1	1	1	6	10	20

TABLE 252.—*Variables: Point scale score × State. Group IV: Colored draft.*

For all men who took point scale examination.

Point Scale score.	State.									Total.
	Alabama.	Arkansas.	District of Columbia.	Kentucky.	Maryland.	North Carolina.	South Carolina.	Texas.	Virginia.	
100										0
95–99						1				1
90–94									1	1
85–89						1		1	1	3
80–84			1					2	3	6
75–79				1		1		3	4	9
70–74		1				3		15	9	28
65–69		2	2		1	3		16	8	32
60–64			2					25	20	47
55–59		3	1		1	5		19	11	40
50–54		2	4		1	5	5	37	18	72
45–49		5	1			5		26	4	41
40–44		2	1	1	1	3		16	11	35
35–39		8	1			3		3	8	23
30–34		6				2		2	5	15
25–29		2				3		3	2	10
20–24	1	2						1	1	5
15–19				3						3
10–14						1				1
5– 9										0
0– 4										0
Total	1	33	13	5	4	36	5	169	106	372

TABLE 253.—*Variables: Stanford-Binet mental age × State. Group IV: Colored draft.*

For all men who took Stanford-Binet examination.

Stanford-Binet mental age.	State.											Total.
	Alabama.	Arkansas.	Georgia.	Kansas.	Kentucky.	Maryland.	New York.	North Carolina.	Tennessee.	Texas.	Virginia.	
14.0–14.4						1						1
13.5–13.9												0
13.0–13.4										2		2
12.5–12.9	1											1
12.0–12.4										2	1	3
11.5–11.9										1		1
11.0–11.4										3		3
10.5–10.9								1		3		4
10.0–10.4								3			6	9
9.5– 9.9					1		1	1	1	5	7	16
9.0– 9.4		2			2	1	7	2		22	3	39
8.5– 8.9				1						22		23
8.0– 8.4	5			1	1		1	2	1	13	1	25
7.5– 7.9	1			2	1				1	5		10
7.0– 7.4	7		2	4	2		1		4	5		25
6.5– 6.9	2			3	1			4		2		12
6.0– 6.4	3			2	4				1	1	1	12
5.5– 5.9	3				1							4
5.0– 5.4	3											3
4.5– 4.9	1											1
4.0– 4.4												0
3.5– 3.9										1		1
Total	26	2	2	13	13	2	10	13	8	87	19	195

TABLE 254.—*Variables: Alpha score × State. Group IV: Colored draft.*

For all men who took alpha only, alpha and beta only, alpha and individual examination, and alpha, beta and individual examination.

Alpha score.	State.																								Total.
	Alabama.	Arkansas.	District of Columbia.	Florida.	Georgia.	Illinois.	Indiana.	Kansas.	Kentucky.	Louisiana.	Maryland.	Mississippi.	Missouri.	New Jersey.	New York.	North Carolina.	Ohio.	Oklahoma.	Pennsylvania.	South Carolina.	Tennessee.	Texas.	Virginia.	West Virginia.	
160–164						1																			1
155–159																					1				1
150–154							1									1	2				1				5
145–149																	1								1
140–144								1							1		1				1				4
135–139														1	1		2								4
130–134									1				1		1				1						4
125–129						2	1			1	1		1				2		1						9
120–124					1	1	1		1				1		2		3				1				11
115–119									3	3											1		1		8
110–114				1	1		1		1	1			1			1	3	1	3		2	1			17
105–109	1			1	1	1		1	1	1	1				2		2	1	5						18
100–104	1	1		2			3	2	2	4		2	1	1	3	1	3	1	2		4	2	3		38
95– 99		2				1						1	1	1	3		5			1	4	1	1		22
90– 94	3					2	1	2	1	1	4	2		4	2					3	4	3	[illegible]		34
85– 89	1	1	1	2	2	4	3		1	3	2	3	4	5	7		6	1	3		9	5	2		65
80– 84	3			2	1	8	2		3	2	1	4	2	4	8	1	4	2	3	2	7	1	2		62
75– 79	1				4	3	1	2	2	2	2	3	6	1	4	3	6		3	2	13	7	2		67
70– 74	6	1	2	1	2	5	5	5	3	2	2	3	3	2	7	3	3	2	7	2	8	[illegible]	2	1	83
65– 69	6	1		3	6	8	3	2	2	7	5	5	3	1	7	3	9	2	8		7	[illegible]	4	1	95
60– 64	4	4	1	4	2	10	2	2	6	4	3	6	6	2	7	[illegible]	10	3	4	2	16	6	[illegible]		107
55– 59	6	5		7	4	4	3	7	7	7	2	9	6	4	6	1	8	4	7	6	10	8	3	4	128
50– 54	7	4	2	11	3	4	5	4	9	9	5	12	9	5	9	6	5	8	4	4	29	9	1	5	169
45– 49	11	9	2	6	7	10	5	6	9	12	6	12	10	3	8	2	7	4	10	4	30	19	4	2	198
40– 44	12	6	2	9	8	6	4	2	5	19	6	21	13	11	13	6	12	6	9	17	24	28	6	3	248
35– 39	12	9	2	14	20	7	3	6	9	19	9	22	11	8	9	5	10	9	14	11	31	34	2	5	281
30– 34	18	12	4	9	13	7	8	7	15	28	10	33	13	2	14	15	9	7	11	14	46	39	9	8	351
25– 29	24	13	2	21	20	13	7	7	10	27	9	41	18	4	16	16	6	8	15	31	52	47	2	7	416
20– 24	19	9	4	33	25	8	5	8	21	38	13	43	15	9	20	22	13	12	13	28	53	60	2	6	479
15– 19	41	25	4	42	39	12	7	11	19	53	17	57	17	9	10	25	13	7	28	35	50	87	3	9	620
10– 14	33	27	1	67	49	10	1	6	18	80	18	113	16	7	17	32	9	10	12	51	39	109	1	4	730
5– 9	32	37	2	94	79	5	1	4	21	118	26	163	24	12	17	32	8	10	15	71	49	154	2	8	984
0– 4	30	27	1	170	129	6	1	2	21	97	6	218	14	9	3	35	1		1	53	12	226	1	4	1,067
Total	271	193	30	499	416	138	74	87	191	538	148	773	196	105	197	211	163	98	183	334	504	854	57	67	6,327

TABLE 255.—*Variables: Beta score, × State. Group IV: Colored draft.*

For all men who took beta only, alpha and beta only, beta and individual examination, and alpha, beta, and individual examination.

Beta score.	Alabama.	Arkansas.	District of Columbia.	Florida.	Georgia.	Illinois.	Indiana.	Kansas.	Kentucky.	Louisiana.	Maryland.	Mississippi.	Missouri.	New Jersey.	New York.	North Carolina.	Ohio.	Oklahoma.	Pennsylvania.	South Carolina.	Tennessee.	Texas.	Virginia.	West Virginia.	Total.
115–119																1									1
110–114					1																		1		2
105–109																						1			1
100–104					2											1			1			1			5
95– 99	1	2			1														1	1	1				8
90– 94					3											1	1			1	1	5			12
85– 89		1	1		5						1						1					8	4		21
80– 84		1			1		2	1	2			1		1	1	1			1		1	6	2		21
75– 79	2	5			[illegible]				3	2		[illegible]			1		3	2		2	1	5	9		45
70– 74		4	2		15	1	1		2		2	1	2	1	1	1	3	1	1		3	8	5		54
65– 69	1	7	1		21	3	1	1	2	5	4	4	1	1	2	3	2	2	2		8	22	14		107
60– 64	5	8	4		30	1	1	1	6	8	3	5	4	7	2	7	3	8	2	4	8	18	12		149
55– 59	7	7	6	1	[illegible]	4	1	2	13	11	4	7	5	6	2	11	4	4	6	5	12	25	13	1	197
50– 54	11	[illegible]	3	1	[illegible]	2	1	1	6	17	11	13	9	2	5	23	5	6	10	1	12	32	33	1	265
45– 49	10	17	7	1	59	4	6	4	10	[illegible]	11	[illegible]	15		9	27	10	7	17	7	18	42	32	2	375
40– 44	17	[illegible]	9	1	[illegible]	11	4	2	14	[illegible]	18	[illegible]	19	6	3	34	5	16	9	9	20	53	49	3	477
35– 39	34	37	14		115	[illegible]	[illegible]	1	9	42	24	45	17	1	6	46	7	26	15	14	28	54	43	9	632
30– 34	42	[illegible]	7	2	127	13	[illegible]	4	24	[illegible]	19	71	15	5	5	85	5	26	19	31	34	66	68	7	803
25– 29	59	[illegible]	14	8	168	10	8	4	24	7	73	[illegible]	13	8	12	112	4	14	31	51	51	69	91	12	1,113
20– 24	68	71	[illegible]	16	217	14	3	1	26	107	78	17[illegible]	26	8	9	116	7	33	21	79	52	81	115	12	1,311
15– 19	113	[illegible]	38		267	16	3	1	43	140	57	205	10	10	13	165	6	20	21	140	50	89	177	12	1,689
10– 14	197	112	23	2[illegible]	279	6	1	1	52	179	38	1[illegible]	5	3	7	191	3	4	26	244	43	107	198	23	1,785
5– 9	222	[illegible]	15	25	254	4		1	47	175	28	176	10	2	1	181	5	1	22	315	41	135	179	8	1,914
0– 4	270	57	5	41	133	4	1		47	134	16	77	2	3	2	147	2		8	405	35	132	176	1	1,698
Total	1,059	686	168	123	1,868	103	52	28	330	1,012	340	959	153	70	81	1,156	77	200	216	1,309	419	962	1,221	91	12,683

TABLE 256.—*Variables: Alpha score × State. Group V: Colored draft.*

For all men who took alpha only.

Alpha score	Illinois.	Indiana.	New Jersey.	New Mexico.	New York.	Pennsylvania.	Total.
180–184	1						1
175–179	2						2
170–174	1			2			3
165–169				1			1
160–164	2			2	2		6
155–159	2				1		3
150–154	1				1		2
145–149					2	1	3
140–144	4	1	2		3	1	11
135–139	3		1		1		5
130–134	4		2		3		9
125–129	3	2	1		8		14
120–124	3	2	2		8	1	16
115–119	7		6		8	1	22
110–114	7	3	5		10	5	30
105–109	7	3	5		14	6	35
100–104	5	2	3		6	5	21
95– 99	10	5	9		16	6	46
90– 94	6	1	6		15	7	35
85– 89	15	3	15		30	9	72
80– 84	15	6	14		20	13	68
75– 79	22	4	10		31	22	89
70– 74	18	7	11		32	17	85
65– 69	25	5	22		35	16	103
60– 64	33	6	17		32	25	113
55– 59	35	11	29		41	29	145
50– 54	39	14	32		56	29	170
45– 49	[illegible]	10	29		[illegible]	32	159
40– 44	52	14	37		57	35	195
35– 39	40	18	46		59	42	205
30– 34	48	17	41		73	52	231
25– 29	49	9	49		57	35	199
20– 24	33	13	46		68	48	208
15– 19	41	13	[illegible]		88	40	246
10– 14	5	11	31		7	7	61
5– 9	1	10	46		12	8	77
0– 4	3	5	40		2	6	56
Total	578	195	621	5	[illegible]	498	2,747

TABLE 257.—*Variables: Beta score × State. Group V: Colored draft.*

For all men who took beta only.

Beta score.	State.							Total.
	Illinois.	Indiana.	Michigan.	New Jersey.	New York.	Oklahoma.	Pennsylvania.	
100-104	.....	.....	.....	1	.....	.....	.....	1
95- 99	.....	.....	.....	.....	.....	.....	.....	0
90- 94	.....	.....	.....	.....	.....	.....	3	3
85- 89	.....	1	.....	.....	1	.....	2	4
80- 84	1	.....	.....	1	1	.....	1	4
75- 79	5	2	.....	5	.....	.....	5	17
70- 74	5	.....	.....	2	4	.....	2	13
65- 69	11	2	.....	6	4	.....	7	30
60- 64	19	3	.....	10	4	.....	9	45
55- 59	16	2	.....	12	14	.....	12	56
50- 54	29	1	.....	17	6	.....	18	71
45- 49	36	2	.....	16	21	.....	24	99
40- 44	30	5	.....	22	26	.....	36	119
35- 39	42	6	1	27	25	.....	40	141
30- 34	51	3	.....	34	32	.....	39	159
25- 29	56	5	.....	38	26	1	55	181
20- 24	46	6	.....	36	39	.....	60	187
15- 19	42	10	.....	30	11	.....	68	161
10- 14	14	6	.....	25	8	.....	42	95
5- 9	16	5	.....	22	5	.....	37	84
0- 4	3	5	.....	9	3	.....	11	31
Total	422	64	1	313	229	1	471	1,501

TABLE 258.—*Variables: Beta score × State. Group V: Colored draft.*

For all men who took beta only and alpha and beta only.

Beta score.	State.						Total.
	Illinois.	Indiana.	New Jersey.	New York.	Oklahoma.	Pennsylvania.	
100-104	.....	.....	1	.....	.....	.....	1
95- 99	.....	.....	.....	.....	.....	.....	0
90- 94	.....	.....	.....	.....	.....	3	3
85- 89	.....	1	.....	1	.....	2	4
80- 84	1	.....	1	1	.....	2	5
75- 79	5	2	5	.....	.....	5	17
70- 74	5	.....	2	4	.....	3	14
65- 69	13	2	6	10	.....	8	39
60- 64	20	3	14	9	.....	14	60
55- 59	21	2	15	20	.....	19	77
50- 54	38	1	18	20	.....	30	107
45- 49	47	2	19	34	.....	37	139
40- 44	37	5	27	45	.....	46	160
35- 39	54	6	29	55	.....	49	193
30- 34	65	3	36	52	.....	45	201
25- 29	66	5	38	41	1	66	217
20- 24	62	6	37	49	.....	75	229
15- 19	43	10	31	13	.....	77	174
10- 14	14	6	25	8	.....	48	101
5- 9	16	5	22	4	.....	38	85
0- 4	3	5	9	3	.....	11	31
Total	510	64	335	369	1	578	1,857

TABLE 259.—*Variables: Stanford-Binet mental age × State. Group V: Colored draft.*

For all men who took Stanford-Binet examination.

Stanford-Binet mental age.	State.			Total.
	Illinois.	New Jersey.	New York.	
13.0–13.4	1			1
12.5–12.9	1			1
12.0–12.4				0
11.5–11.9	1			1
11.0–11.4	2			2
10.5–10.9	1			1
10.0–10.4	3		2	5
9.5–9.9	6		4	10
9.0–9.4	8	7	27	42
8.5–8.9	6	1	5	12
8.0–8.4	7	3	1	11
7.5–7.9	3		3	6
7.0–7.4	7		1	8
6.5–6.9	3		2	5
6.0–6.4	1			1
5.5–5.9	1			1
Total	51	11	45	107

TABLE 260.—*Variables: Alpha score × State. Group V: Colored draft.*

For all men who took alpha only, alpha and beta only (no cases of alpha and individual examination), and alpha, beta, and individual examination.

Alpha score.	State.						Total.
	Illinois.	Indiana.	New Jersey.	New Mexico.	New York.	Pennsylvania.	
180–184	1						1
175–179	2						2
170–174	1			2			3
165–169				1			1
160–164	2			2	2		6
155–159	2				1		3
150–154	1				1		2
145–149					2	1	3
140–144	4	1	2		3	1	11
135–139	3		1		1		5
130–134	4		2		3		9
125–129	3	2	1		8		14
120–124	3	2	2		8	1	16
115–119	7		6		8	1	22
110–114	7	3	5		10	6	31
105–109	7	3	5		14	6	35
100–104	5	2	3		6	5	21
95–99	10	5	9		16	6	46
90–94	6	1	6		15	7	35
85–89	15	3	15		30	9	72
80–84	15	6	14		20	13	68
75–79	22	4	10		31	22	89
70–74	18	7	11		32	18	86
65–69	25	5	22		35	16	103
60–64	33	6	17		32	25	113
55–59	35	11	29		41	29	145
50–54	39	14	32		56	29	170
45–49	36	10	29		52	32	159
40–44	52	14	37		57	35	195
35–39	40	18	46		59	42	205
30–34	48	17	41		73	53	232
25–29	49	9	49		57	35	199
20–24	53	13	46		68	48	208
15–19	41	13	64		88	42	248
10–14	52	11	42		76	54	235
5–9	27	10	55		57	45	194
0–4	18	5	42		29	26	120
Total	666	195	643	5	994	607	3,107

TABLE 261.—*Variables: Beta score × State. Group V: Colored draft.*

For all men who took beta only, alpha and beta only, beta and individual examination, and alpha, beta, and individual examination.

Beta score.	State. Illinois.	Indiana.	New Jersey.	New York.	Oklahoma.	Pennsylvania.	Total.
100-104			1				1
95- 99							0
90- 94							3
85- 89		1		1		2	4
80- 84	1		1	1		2	5
75- 79	5	2	5			5	17
70- 74	5		2	1		3	14
65- 69	11	2	6	10		8	40
60- 64	20	3	11	9		14	60
55- 59	21	2	15	20		19	77
50- 54	38	1	18	20		30	107
45- 49	47	2	19	34		37	139
40- 44	37	5	27	45		46	160
35- 39	54	6	29	55		49	193
30- 34	66	3	36	52		45	202
25- 29	67	5	38	41	1	66	218
20- 24	67	6	37	52		75	237
15- 19	51	10	33	33		77	204
10- 14	31	9	30	24		48	139
5- 9	29	5	26	9		38	107
0- 4	8	5	9	1		11	34
Total	558	64	346	414	1	578	1,961

TABLE 262.—*Variables: Alpha score × State. Groups IV and V: Colored draft.*

For all men who took alpha only.

Alpha score.	State. Alabama.	Arkansas.	District of Columbia.	Florida.	Georgia.	Illinois.	Indiana.	Kansas.	Kentucky.	Louisiana.	Maryland.	Mississippi.	Missouri.	New Jersey.	New York.	North Carolina.	Ohio.	Oklahoma.	Pennsylvania.	South Carolina.	Tennessee.	Texas.	Virginia.	West Virginia.	Total.
180-184						1																			1
175-179						2																			2
170-174						1																			1
165-169																									0
160-164						3									2										5
155-159						2									1						1				4
150-154						1	1								1	1	2				1				7
145-149															2		1		1						4
140-144						4	1	1						2	4		1		1		1				15
135-139						3								2	2		2								9
130-134						7			1				1	2	4				1						13
125-129						7	3			1	1		1	1	8		2		1						23
120-124					1	4	3		1				1	2	10		3		1		1				27
115-119						7			3	3				6	8				1		1		1		30
110-114				1	1	7	4		1	1			1	5	10	1	3	1	8		2	1			47
105-109	1			1	1	8	3	1	1	1	1			5	16		2	1	11						53
100-104	1	1		2		5	5	2	2	4		2	1	4	9	1	3	1	7		4	2	3		59
95- 99		2				11	5					1	1	10	19		5		7		1	1	1		68
90- 94	3					8	7	2	1	1	4	2		10	17				10		4	3	2		69
85- 89	1	1	1	2	2	19	6		1	3	2	3	4	20	37		6	1	12		9	5	2		137
80- 84	3			2	1	23	8		3	2	1	4	2	18	28	1	4	2	16	2	7	1	2		130
75- 79	1				4	25	5	2	2	2	2	3	6	11	35	3	6		25	2	13	7	2		156
70- 74	6	1	2	1	2	23	12	5	3	2	2	3	3	13	39	3	3	2	24	2	8	6	2		167
65- 69	6	1		3	6	32	8	2	2	7	5	5	3	22	42	3	9	2	24		7	2	4	1	196
60- 64	4	4	1	4	2	43	8	2	6	4	3	6	6	19	39	1	10	3	29	2	16	6	2	1	221
55- 59	6	5		7	4	39	14	7	7	7	2	9		33	47	1	8	4	36	6	10	8	3		269
50- 54	7	4	2	11	2	43	19	4	9	9	5	12	9	37	65	6	5	8	33	4	29	9	1	4	337
45- 49	11	8	2	6	5	46	15	6	9	12	6	12	10	32	60	2	7	4	42	4	30	18	4	5	356
40- 44	12	6	2	9	7	58	18	2	5	19	6	21	13	48	70	6	12	6	44	17	24	26	6	2	439
35- 39	12	9	2	14	17	47	21	7	9	19	9	22	11	54	68	5	10	9	56	11	31	34	2	3	481
30- 34	18	12	4	9	13	55	25	7	15	28	9	33	13	43	87	15	9	6	63	11	46	36	9	5	571
25- 29	24	13	1	21	15	62	16	7	10	27	7	41	18	53	73	16	6	8	50	31	52	47	2	8	608
20- 24	19	9	3	33	17	41	18	8	21	38	11	43	15	55	88	22	12	9	61	28	33	55	2	7	668
15- 19	11	25	2	42	22	52	20	11	19	33	10	77	17	73	98	25	13	5	68	35	50	82	3	6	829
10- 14	30	23		67	36	10	12	4	18	31	10	109	7	38	14	32	3	8	10	51	38	8	1	9	569
5- 9	28	35		84	62	4	11	4	21	60	10	162	11	58	15	32	4	7	12	71	48	18	1	3	771
0- 4	28	22		170	99	6	6	2	21	67	3	215	7	48	3	34	1		7	53	12	37	1	3	845
Total	262	181	22	499	319	704	269	85	191	401	109	765	167	724	1,021	210	152	87	664	334	502	442	56	57	8,190

TABLE 263.—*Variables: Beta score × State. Groups IV and V: Colored draft.*

For all men who took beta only.

Beta score.	State.																							Total.
	Alabama.	Arkansas.	District of Columbia.	Florida.	Georgia.	Illinois.	Indiana.	Kansas.	Kentucky.	Louisiana.	Maryland.	Mississippi.	Missouri.	New Jersey.	New York.	North Carolina.	Ohio.	Oklahoma.	Pennsylvania.	South Carolina.	Tennessee.	Texas.	Virginia.	West Virginia.	
115-118																1									1
110-114					1																		1		2
105-109																						1			1
100-104					2									1		1			1			1			6
95-99	1	1			1														1		1				6
90-94					2											1	1		3	1	1	3			12
85-89		1			5		1				1				1		1		2			3	4		19
80-84					1	1	2	1	2			1		2	1	1			2		1	1	2		18
75-79	2	5			8	5	2		3	2		2		5	1		3	2	5	2	1	1	9		58
70-74		4	2		15	6	1		2		2	1	2	3	5	1	3	1	3		3	2	5		61
65-69	1	7	1		17	14	3	1	2	4	4	4	1	7	6	2	2	2	8		8	3	14		112
60-64	5	7	4	8	25	20	4	1	6	6	4	5	4	17	5	7	3	7	11	4	8	2	12		167
55-59	6	7	4	1	32	19	3	1	13	7	1	7	5	18	15	11	3	4	18	5	12	5	13	1	211
50-54	11	12	2	1	40	31	2	1	6	12	8	13	6	19	9	23	6	5	27	1	12	4	33	1	285
45-49	10	15	6		50	40	8	4	10	14	10	34	12	16	25	27	8	6	39	7	18	8	32	1	400
40-44	16	39	9	1	67	39	9	2	14	5	12	38	15	28	28	34	4	14	41	9	20	17	49	3	516
35-39	33	35	13		104	50	15	4	9	26	19	65	10	28	26	46	3	24	55	14	27	12	43	6	667
30-34	41	45	6	2	133	62	13	3	21	37	14	71	10	39	34	85	5	25	58	31	34	22	68	5	817
25-29	58	68	13	8	154	65	13	4	24	54	25	141	12	46	33	112	4	45	80	51	51	32	91	11	1,195
20-24	65	67	18	16	212	57	9	1	26	95	47	157	21	44	45	114	5	31	79	79	52	37	114	11	1,402
15-19	112	83	37		261	53	12	1	43	128	43	205	9	39	19	158	5	20	89	139	49	43	162	11	1,721
10-14	194	98	11	26	275	20	7	1	52	175	31	195	5	34	11	184	3	3	67	241	43	41	171	23	1,911
5-9	219	76	11	26	249	20	5	1	45	169	29	130	10	24	5	168	5	1	57	313	41	36	164	7	1,811
0-4	269	44	5	41	133	6	6		41	125	12	77	2	12	5	141	1		18	405	33	22	160	1	1,559
Total	1,043	614	142	122	1,767	508	115	26	322	859	262	1,146	124	382	274	1,118	65	190	667	1,303	415	296	1,147	81	12,988

TABLE 264.—*Variables: Beta score × State. Groups IV and V: Colored draft.*

For all men who took beta only and alpha and beta only.

Beta score.	State.																							Total.
	Alabama.	Arkansas.	District of Columbia.	Florida.	Georgia.	Illinois.	Indiana.	Kansas.	Kentucky.	Louisiana.	Maryland.	Mississippi.	Missouri.	New Jersey.	New York.	North Carolina.	Ohio.	Oklahoma.	Pennsylvania.	South Carolina.	Tennessee.	Texas.	Virginia.	West Virginia.	
115-118																1									1
110-114					1																		1		2
105-109																						1			1
100-104					2									1		1			1			1			6
95-99	1	1			1														1	1	1				6
90-94					3											1	1		3	1	1	5			15
85-89		1	1		5		1				1				1		1		2			8	4		25
80-84		1			1	1	2	1	2			1		2	2	1			5			6	2		26
75-79	2	3			8	5	2		3	2		2		5	1		3	2	5	2	1	5	9		62
70-74		4	2		15	6	1		2		2	1	2	3	5	1	3	1	4		3	8	5		68
65-69	1	7	1		21	16	3	1	2	5	4	4	1	7	12	3	2	2	10		8	22	14		146
60-64	5	8	4		30	21	4	1	6	8	5	5	4	21	11	7	3	8	16	4	8	18	12		209
55-59	7	7	6	1	40	25	3	2	13	11	4	7	5	21	22	11	4	4	25	5	12	25	13	1	274
50-54	11	13	3	1	46	40	2	1	6	17	11	13	9	20	25	23	6	6	40	1	12	32	33	1	372
45-49	10	15	7		59	51	8	4	10	27	11	35	15	19	43	27	10	7	54	7	18	42	32	2	513
40-44	17	40	9	1	76	48	9	2	14	20	18	39	19	33	48	34	5	16	55	9	20	53	49	3	637
35-39	34	37	14		115	64	15	4	9	42	24	65	17	30	61	46	7	26	67	14	28	53	43	9	824
30-34	41	46	7	2	127	78	13	4	24	72	19	71	15	41	57	85	5	26	64	31	34	66	68	7	1,003
25-29	59	69	14	8	168	76	13	4	24	72	33	141	13	46	53	112	4	45	97	51	51	66	91	12	1,325
20-24	68	69	19	16	217	74	9	1	26	106	47	159	26	45	57	114	7	33	96	79	52	76	114	12	1,522
15-19	113	84	37		267	56	12	1	43	129	45	205	10	41	21	158	6	20	98	139	50	61	162	12	1,780
10-14	195	98	11	26	279	20	7	1	52	177	33	196	5	34	11	184	3	4	74	241	43	56	171	23	1,944
5-9	219	76	11	26	254	20	5	1	45	173	30	130	10	24	5	168	5	1	60	313	41	45	164	8	1,834
0-4	269	44	5	41	133	6	6		41	125	12	77	2	12	5	141	1		19	405	33	23	160	1	1,561
Total	1,052	625	151	122	1,868	607	115	28	322	996	299	1,154	153	405	440	1,118	76	201	794	1,303	417	672	1,147	91	14,156

TABLE 265.—*Variables: Stanford-Binet mental age × State. Groups IV and V: Colored draft.*

For all men who took Stanford-Binet examination.

Sanford-Benet mental age.	State.													Total.
	Alabama.	Arkansas.	Georgia.	Illinois.	Kansas.	Kentucky.	Maryland.	New Jersey.	New York.	North Carolina.	Tennessee.	Texas.	Virginia.	
14.0–14.4							1							1
13.5–13.9														0
13.0–13.4				1								2		3
12.5–12.9	1			1										2
12.0–12.4												2	1	3
11.5–11.9				1								1		2
11.0–11.4				2								3		5
10.5–10.9				1						1		3		5
10.0–10.4				3					2	3			6	14
9.5– 9.9				6		1			5	1	1	5	7	26
9.0– 9.4		2		8		2	1	7	34	2		22	3	81
8.5– 8.9				6	1			1	5			22		35
8.0– 8.4	5			7	1	1		3	2	2	1	13	1	36
7.5– 7.9	1			3	2	1			3		1	5		16
7.0– 7.4	7		2	7	4	2			2		4	5		33
6.5– 6.9	2			3	3	1			2	4		2		17
6.0– 6.4	3			1	2	4					1	1	1	13
5.5– 5.9	3			1		1								5
5.0– 5.4	3													3
4.5– 4.9	1													1
4.0– 4.4														0
3.5– 3.9												1		1
Total	26	2	2	51	13	13	2	11	55	13	8	87	19	302

TABLE 266.—*Variables: Alpha score × State. Groups IV and V: Colored draft.*

For all men who took alpha only, alpha and beta only, alpha and individual examination, and alpha, beta, and individual examination.

Alpha score.	State.																									Total.
	Alabama.	Arkansas.	District of Columbia.	Florida.	Georgia.	Illinois.	Indiana.	Kansas.	Kentucky.	Louisiana.	Maryland.	Mississippi.	Missouri.	New Jersey.	New York.	North Carolina.	Ohio.	Oklahoma.	Pennsylvania.	South Carolina.	Tennessee.	Texas.	Virginia.	West Virginia.		
180–184						1																				1
175–179						2																				2
170–174						1																				1
165–169																										0
160–164						3									2											5
155–159						2									1						1					4
150–154						1	1								1	1	2				1					7
145–149															2		1		1							4
140–144						4	1	1						2	4		1		1		1					15
135–139						3								2	2		2									9
130–134						4			1				1	2	4				1							13
125–129						5	3			1	1		1	1	8		2		1							23
120–124					1	4	3		1				1	2	10		3		1		1					27
115–119						7			3	3				6	8				1		1		1			30
110–114				1	1	7	4		1	1			1	5	10	1	3	1	9		2	1				48
105–109	1			1	1	8	1	1	1	1	1			5	16		2	1	11							53
100–104	1	1		2		5	5	2	2	4		2	1	4	9	1	3	1	7		4	2	3			59
95– 99		2				11	5					1	1	10	19		5		7	1	4	1	1			68
90– 94	3					8	2	2	1	1	4	2		10	17				10		4	3	2			69
85– 89	1	1	1	2	2	19	6		1	3	2	3	4	20	37		6	1	12		9	5	2			137
80– 84	3			2	1	23	8		3	2	1	4	2	18	28	1	4	2	16	2	7	1	2			130
75– 79	1				4	25	5	2	2	2	2	3	6	11	35	3	6		25	2	13	7	2			156
70– 74	6	1	2	1	2	23	12	5	3	2	2	3	3	13	39	3	3	2	25	2	8	6	2	1		169
65– 69	6	1		3	6	33	8	2	2	7	5	5	3	23	42	3	9	2	24		7	2	4	1		198
60– 64	4	4	1	4	2	43	8	2	6	4	3	6	6	19	39	1	10	3	29	2	16	6	2			220
55– 59	6	5		7	4	39	14	7	7	7	2	9	6	33	47	1	8	4	36	6	10	8	3	4		273
50– 54	7	4	2	11	3	43	19	4	9	9	5	12	9	37	65	6	5	8	33	4	29	9	1	5		339
45– 49	11	9	2	6	7	46	15	6	9	12	6	12	10	32	60	2	7	4	42	4	30	19	4	2		357
40– 44	12	6	2	9	8	58	18	2	5	19	6	21	13	48	70	6	12	6	44	17	24	28	6	3		443
35– 39	12	9	2	14	20	47	21	6	9	19	9	22	11	54	68	5	10	9	56	11	31	34	2	5		486
30– 34	18	12	4	9	13	55	25	7	15	28	10	33	13	43	87	15	9	7	64	14	46	39	9	8		583
25– 29	24	13	2	21	20	62	16	7	10	27	9	41	18	53	73	16	6	8	50	31	52	47	2	7		615
20– 24	19	9	4	33	25	41	18	8	21	38	13	43	15	55	88	22	13	12	61	28	53	60	2	6		687
15– 19	41	25	4	42	39	53	20	11	19	53	17	57	17	73	98	25	13	7	70	35	50	87	3	9		868
10– 14	33	27	1	67	49	62	12	6	18	80	18	113	16	49	93	32	9	10	66	51	39	109	1	4		965
5– 9	32	37	2	94	79	32	11	4	21	118	26	163	24	67	74	32	8	10	60	71	49	154	2	8		1,178
0– 4	30	27	1	170	129	24	6	2	21	97	6	218	14	51	32	35	1		27	53	12	226	1	4		1,187
Total	271	193	30	499	416	804	269	87	191	538	148	773	196	748	1,188	211	163	98	790	334	504	854	57	67		9,429

TABLE 267.—*Variables: Beta score × State. Groups IV and V: Colored draft.*

For all men who took beta only, alpha and beta only, beta and individual examination, and alpha, beta, and individual examination.

Beta score.	State.																								Total.
	Alabama.	Arkansas.	District of Columbia.	Florida.	Georgia.	Illinois.	Indiana.	Kansas.	Kentucky.	Louisiana.	Maryland.	Mississippi.	Missouri.	New Jersey.	New York.	North Carolina.	Ohio.	Oklahoma.	Pennsylvania.	South Carolina.	Tennessee.	Texas.	Virginia.	West Virginia.	
115–118																1									1
110–114					1																				1
105–109																						1			1
100–104					2									1		1			1			1			6
95– 99	1	1			1														1	1	1				6
90– 94					3											1	1		3	1	1	5			15
85– 89		1	1		5		1				1				1		1		2			8	4		25
80– 84					1	1	2	1	2			1		2	2	1			3		1	6	2		26
75– 79	2	5			8	5	2		3	2		2		5	1		3	2	5	2	1	5	9		62
70– 74		4	2		15	6	1		2		2	1	2	3	5	1	3	1	4		3	8	5		68
65– 69	1	7	1		21	17	3	1	2	5	4	4	1	7	12	3	2	2	10		8	22	14		147
60– 64	5	8	4		30	21	4	1	6	8	5	5	4	21	11	7	3	8	16	4	8	18	12		209
55– 59	7	7	6	1	40	25	3	2	13	11	4	7	5	21	22	11	4	4	25	5	12	25	13	1	274
50– 54	11	13	3	1	46	40	2	1	6	17	11	13	9	20	25	23	6	6	40	1	12	32	33	1	372
45– 49	10	15	7	1	59	51	8	4	10	27	11	35	15	19	43	27	10	7	54	7	18	42	32	2	514
40– 44	17	40	9	1	76	48	9	2	14	20	18	39	19	33	48	34	5	16	55	9	20	53	49	3	637
35– 39	34	37	14		115	64	15	4	9	42	24	65	17	30	61	46	7	26	67	14	28	54	43	9	825
30– 34	42	46	7	2	127	79	13	4	24	72	19	71	15	41	57	85	5	26	64	31	34	66	68	7	1,005
25– 29	59	69	14	8	168	77	13	4	24	73	34	144	13	46	53	112	4	45	97	51	51	69	91	12	1,331
20– 24	68	71	19	16	217	81	9	1	26	107	48	159	26	45	61	116	7	33	96	79	52	84	115	12	1,548
15– 19	113	93	38		267	67	13	1	43	140	57	205	10	43	46	165	6	20	98	140	50	89	177	12	1,893
10– 14	197	112	23	26	279	37	7	1	52	179	48	1	5	39	31	191	3	4	74	244	43	107	198	23	1,924
5– 9	222	99	15	26	254	33	5	1	47	175	38	130	10	28	10	184	5	1	60	315	41	135	179	8	2,021
0– 4	270	57	5	41	133	9	6		47	134	16	77	2	12	6	147	2		19	405	35	132	176	1	1,732
Total	1,050	686	168	123	1,868	661	116	28	330	1,012	340	959	153	416	495	1,156	77	201	794	1,309	419	962	1,220	91	14,643

Figure 21 gives a graphic comparison of the percentages of inferior, average, and superior men for the 24 States of Group IV which have more than 100 cases. The States are arranged from top to bottom according to the percentage of inferior men they have. The black portion represents the percentage of inferior men, the lined portion the percentage of average men, and the clear portion the percentage of superior men. The number of cases for each State is given in table 247. It will be seen from an examination of this chart that the States fall roughly into three groups. The first group consists of northern States and is highest in intelligence. The second group consists of the more northern and western southern States and is intermediate in intelligence. The third group consists of the more southern and eastern southern States and is lowest in intelligence.

We now turn to the comparison between northern and southern States for the purpose of which Group V was made up. The comparison is between the five representative northern States of Group V and four States chosen to represent the South from Group IV. The four States so chosen are Alabama, Georgia, Louisiana, and Mississippi. The distributions by letter grade for the five northern States and for the four southern States are given together for convenience of comparison in table 268. Figure 22 presents the data contained in this table in graphic form. In this chart the area representing each State or group of States is divided into a black portion which represents the percentage of inferior men, a barred portion which represents the percentage of average men, and a clear portion which represents the percentage of superior men. The significant difference between the northern and southern States appears very strikingly and requires no further comment.

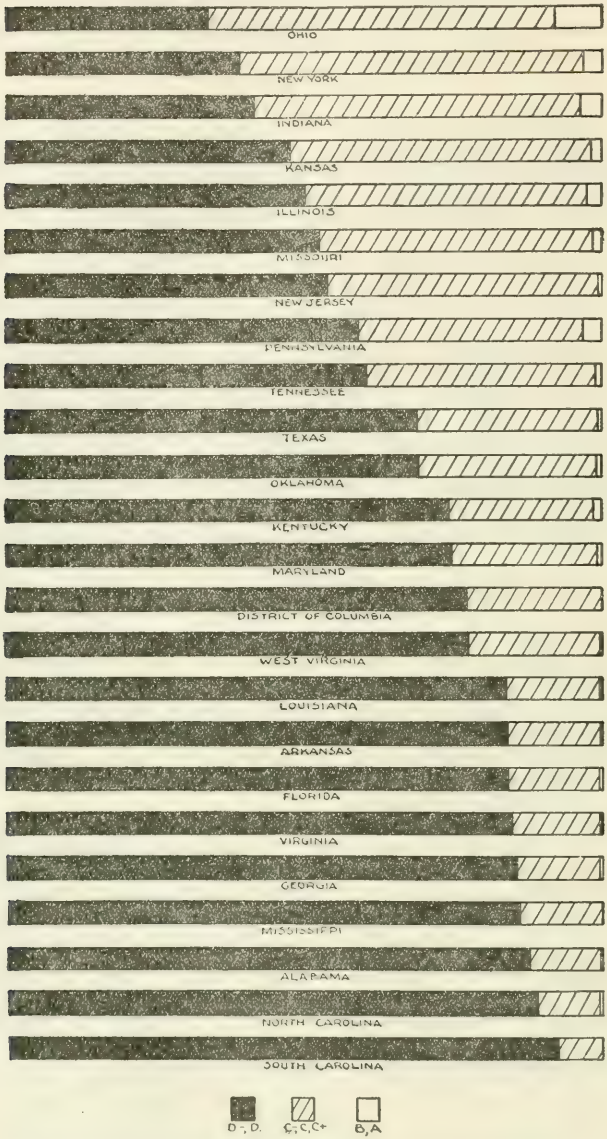

FIG. 21. Percentage distribution of inferior, average, and superior grades by State (negroes Group IV).

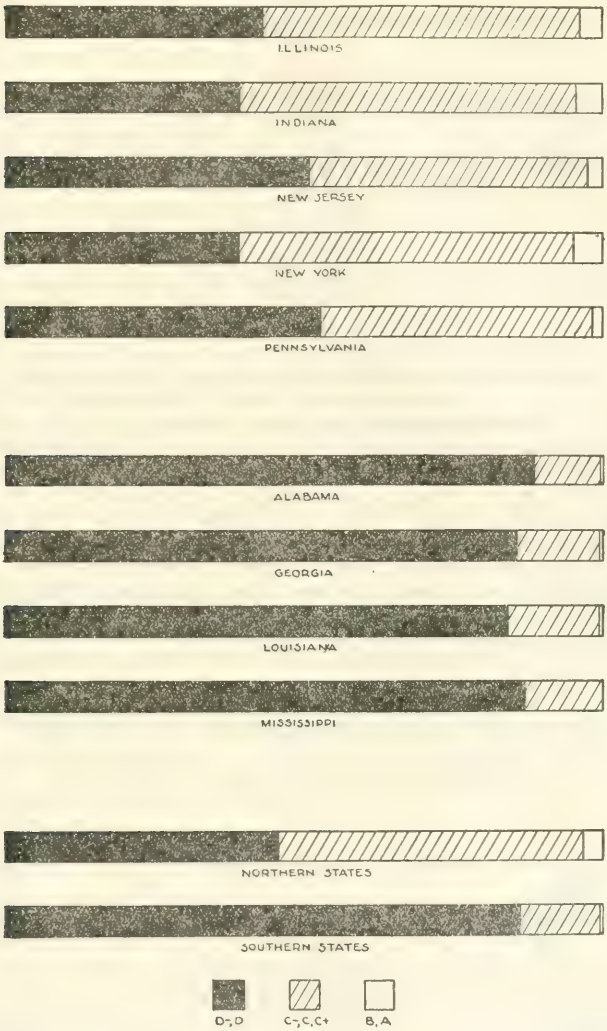

FIG. 22. Comparison of northern and southern negroes. Percentage distributions by letter grades for five northern States (Group V) and four southern States (Group IV).

TABLE 268.—*Comparison of northern and southern negroes. Percentage distribution by letter grade.*

State.	Number of cases.	D−.	D.	C−.	C.	C+.	B.	A.
GROUP V: NEGROES OF FIVE NORTHERN STATES.								
Illinois	1,139	10.6	32.4	28.1	18.5	6.5	2.4	1.4
Indiana	259	20.1	19.7	25.4	22.0	8.5	3.9	0.4
New Jersey	967	22.2	28.6	24.7	15.8	6.0	2.2	0.4
New York	1,264	7.0	31.9	26.0	20.7	9.5	4.0	0.8
Pennsylvania	1,076	18.1	34.3	24.5	15.3	6.1	1.5	0.2
Total	4,705	14.4	31.2	25.8	18.0	7.2	2.7	0.7
GROUP IV: NEGROES OF FOUR SOUTHERN STATES.								
Alabama	1,342	67.6	20.8	7.4	3.2	0.7	0.2	0.1
Georgia	2,187	51.9	33.9	10.4	2.9	0.6	0.3	0.1
Louisiana	1,398	55.3	28.9	11.2	3.4	0.9	0.4	.....
Mississippi	1,919	57.1	30.2	9.2	2.8	0.8	.....	.....
Total	6,846	57.0	29.2	9.6	3.4	0.7	0.2	0.1

A further indication of difference between northern and southern negroes is to be found in the percentage of men who received their final rating on alpha, beta, and individual examination, respectively. Table 269 gives the percentages of men in the different States in the northern and southern groups who received their final grade on alpha, beta (including alpha-beta), and individual examination, respectively. The table also gives similar percentages for the two groups as a whole. It will be observed that the percentage of alphas is very much smaller and the percentage of betas very much larger in the southern than in the northern group. The percentage of individual examinations is small in both groups, but this is due to camp procedure which allowed many group examination failures to go without reexamination, especially when the number to be examined was large. This difference between northern and southern negroes in the number taking alpha and beta, respectively, is partly indicative of a difference in literacy between northern and southern negroes, and this in turn is closely related to the matter of schooling. The question of the schooling of the negro is considered in chapter 10.

TABLE 269.—*Comparison of northern and southern negroes. Percentage of cases receiving final rating on the different examinations.*

State.	Alpha.	All beta.	Individual.	Number of cases.
GROUP V: FIVE NORTHERN STATES.				
Illinois	50.8	44.7	4.5	1,139
Indiana	75.3	24.7	.....	259
New Jersey	64.3	34.6	1.1	967
New York	67.2	29.2	3.6	1,264
Pennsylvania	46.4	53.8	.....	1,076
Total	58.2	39.4	2.4	4,705
GROUP IV: FOUR SOUTHERN STATES.				
Alabama	19.5	78.5	2.0	1,342
Georgia	14.5	85.5	0.1	2,187
Louisiana	28.7	71.2	0.1	1,398
Mississippi	39.8	60.2	.....	1,919
Total	25.5	74.0	0.4	6,846

Camp reports substantially bear out the results obtained from the Hollerith principal sample as far as the comparisons between negroes and whites and between northern and southern negroes are concerned. A percentage distribution of letter grades of 32,916 was made up in December, 1918, on the basis of reports on draft quotas from camps Bowie, Dodge,

Grant, Greene, Jackson, Lee, Pike, Travis, and Upton. This distribution is compared with the distribution obtained in Group IV as follows:

Source of distribution.	Number of cases.	D−.	D.	C−.	C.	C+.	B.	A.
Camp reports	32,916	18.8	51.6	19.1	7.4	2.1	0.7	0.3
Group IV	18,891	49.0	29.7	12.9	5.7	2.0	.6	.2

The two distributions correspond fairly closely if D− and D grades are taken together. The first distribution, however, has a much smaller percentage of D− and a larger percentage of D grades than has that of Group IV. The reason for this is that in this distribution the D− cases who were not recalled, about 8,000 in number, were "pro-rated on the individual scale in proportion to the percentage distribution of letter grades."

Camp Dix (October 31, 1918) submitted a report on the July draft which included a study of 3,127 negroes. One of the conclusions of this report is that "in general the southern negro is as much inferior to the northern negro as negroes are inferior to whites."

Another summary of reports from camps Funston, Gordon, Grant, and Upton makes a comparison between 14,997 southern and 8,165 northern negroes whose grades are given in these reports. The comparison is based on alpha and beta grades with the small number of individual examinations left out of account. A comparison between the percentage letter-grade distributions thus obtained and those for the five northern and four southern States compared in the Hollerith analysis gives the following:

Source of distribution.	Number of cases.	D−.	D.	C−.	C.	C+.	B.	A.
Summary (four camps):								
Northern negroes	8,165	19.6	27.6	22.1	21.4	6.7	2.3	0.6
Southern negroes	14,994	55.7	26.4	9.8	6.2	1.4	0.4	0.1
Group V, northern negroes	4,705	14.4	31.2	25.8	18.0	7.2	2.7	0.7
Group IV, four States, southern negroes	6,846	57.0	29.2	9.6	3.4	0.7	0.2	0.1

The only data on colored officers and officers' training camp candidates at present available are those contained in a report from Camp Dodge (June 8, 1918). This report presents a comparison of percentage letter-grade distributions of 1,385 white officers below the rank of major, 95 colored officers below the rank of major, and 273 members of the colored officers' training camp, fourth series. Ratings were made on the basis of alpha examination only. The percentage distributions are as follows:

Officer group.	Number of cases.	D−.	D.	C−.	C.	C+.	B.	A.
White officers	1,385	0.1	0.3	0.7	6.2	12.3	31.2	49.2
Negro officers	95	3.3	10.0	5.3	22.1	21.0	24.2	14.7
Negro officers' training camp	273	2.2	10.5	20.8	35.6	19.4	8.1	3.4

The distribution of the negro officers' training camp candidates just about corresponds to the distribution of the white draft with somewhat smaller percentages of inferior men among the negro officers' training camp candidates. The negro officers have a larger percentage of superior men, but their percentage of inferior men is as high as that of the colored officers' training camp candidates.

At Camp Lee the experiment was tried of separating some of the negro recruits on the basis of skin color and comparing the intelligence ratings obtained from the lighter and darker groups. The report (June 6, 1918) describes the experiment as tried on two battalions of

negro recruits as follows: "The lighter class contained those whose color indicated that they were true mulattoes or persons of a larger proportion of white blood than true mulattoes. The darker class contained pure negroes and those whose skin color indicated that they had a smaller proportion of white blood than true mulattoes. The classification was made by the various examiners of the groups.

"In alpha, the lighter negroes obtained a median score of 50; the darker obtained a median of 30. In beta, the lighter negroes obtained a median score of 36; the darker obtained a median of 29.

"The percentage of darker negroes was greater among the illiterates than among the literates. In the alpha group 82 per cent of the negroes were darker and 18 per cent lighter; in the beta group 88.5 per cent of the negroes were darker and 11.5 per cent were lighter."

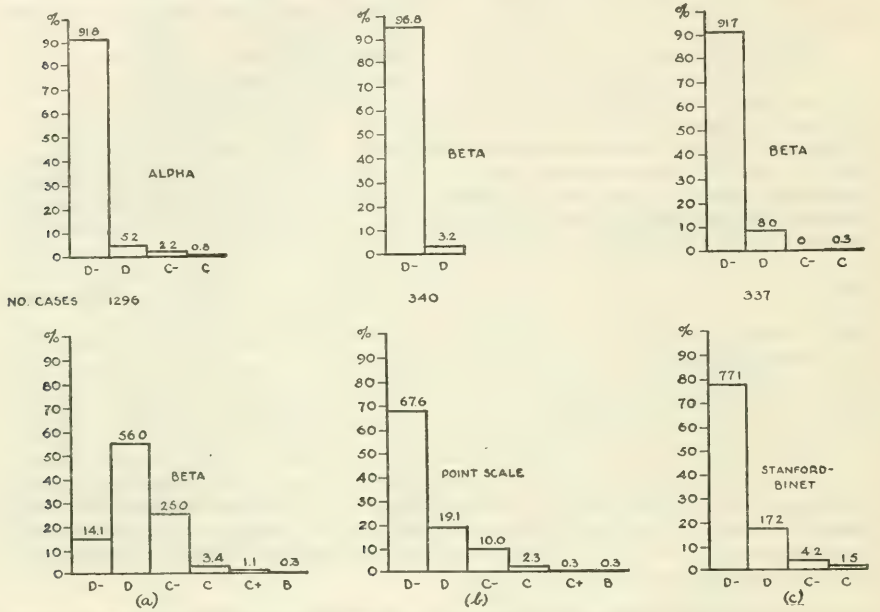

FIG. 23. Percentage distributions by letter grades on two examinations of negroes who took (*a*) alpha and then beta; (*b*) beta and then the point scale; (*c*) beta and then the Stanford-Binet examination.

Hollerith sortings were made of cases taking both alpha and beta, also of cases taking both beta and individual examination. The men who took more than one examination were, of course, almost entirely men who had made a failure or a very low grade on the first. It is desired to compare the results of the first and second examination in order to see how the second examination redistributes the men who made low grades on the first. Only three tables have a sufficiently large number of cases to warrant their inclusion and consideration here. These are tables 270, 271, and 272. The results are given graphically in figure 23. The first part of this chart (*a*) shows how beta redistributed 1,296 men who had already taken alpha. The distributions are made by letter grade and the height of the columns represents the percentage of cases making a given grade. It will be seen that most of the alpha men are of D− grade. When these same men take beta, only 14.1 per cent of them fail to make scores higher than D−. The number who rate as D and therefore still inferior is large, but there are approximately 30 per cent who rate above D instead of 3 per cent so rating on alpha. Altogether the distribution effected by beta is quite a significant improvement over that effected by alpha.

It should be borne in mind that the negroes are all English-speaking, and that since they were allowed to take alpha they must have had some claim to literacy. The result seems to suggest that "near-literacy" may be the reason for a good many alpha failures.

The redistribution of beta failures by point scale and Stanford-Binet examinations (*b* and *c*, fig. 23) shows much less difference between the results of the first and second examinations. In the first group of 340 cases examined by beta and the point scale examination the percentage of D− grades decreases from 96.8 per cent to 67.6 per cent, and the percentage of men making grades higher than D− increases from 3.2 per cent to 32.4 per cent. In the second group of 337 cases examined by beta and the Stanford-Binet examination the percentage of D− grades decreases from 91.7 per cent to 77.1 per cent, and the percentage of men making higher grades than D− increases from 8.3 per cent to 22.9 per cent.

TABLE 270.—*Variables: Alpha score × beta score. Groups IV and V: Colored draft.*

For men who took alpha and beta only, or alpha, beta, and an individual examination.

Alpha score.	Beta score..																			
	0–1	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	Total.
70–74										1								1			2
65–69									1												1
60–64																		1			1
55–59																					0
50–54													1								1
45–49							1						1	1					1	1	5
40–44									1	1						1					3
35–39						1		1											1		3
30–34							2		2	3				2	1		1				11
25–29					1	1	1	3	2		3	1									12
20–24				1		2	1	5	4	1	1	2	2	2			1				25
15–19					6	4	6	3	3	7	4	8	2	1							42
10–14	1	3	6	12	29	40	48	58	56	54	47	31	20	20	4	3	2	2	1		424
5– 9	1	10	17	25	44	53	60	64	38	44	25	18	12	7	1		1				420
0– 4	7	31	33	36	54	34	45	32	30	15	11	7	4	1	1		3	2			346
Total	9	44	56	74	134	135	164	166	127	121	94	67	42	34	7	4	8	6	3	1	1,296

TABLE 271.—*Variables: Beta score × score on Stanford-Binet examination. Groups IV and V: Colored draft.*

For men who took Stanford-Binet examination following beta, or following alpha and beta.

Beta score.	Mental age on Stanford-Binet examination.																	
	3.–5.9	6.0–6.4	6.5–6.9	7.0–7.4	7.5–7.9	8.0–8.4	8.5–8.9	9.0–9.4	9.5–9.9	10.0–10.4	10.5–10.9	11.0–11.4	11.5–11.9	12.0–12.4	12.5–12.9	13.0–13.4	13.5–13.9	14.0–14.4	Total.
65–69										1									1
35–39								1				1							2
30–34																			0
25–29			1		1			1	1										4
20–24						3	4	9	1		1	1			1	1			21
15–19			1	6	3	6	8	27	10	3	5	1				1			70
10–14		1		5	5	16	11	29	7	8	2	3	1	1	1			2	92
5– 9	1	4	4	7	2	13	11	21	7	6	2		2	1		1			82
0– 4	2	4	7	11	7	8	15	6	2	1	1			1					65
Total	3	9	13	29	18	46	49	93	28	19	11	6	3	3	2	3	0	2	337

TABLE 272.—*Variables: Beta score × score on point scale examination. Groups IV and V: Colored draft.*

For men who took point scale examination following beta, or following alpha and beta.

Beta score.	Total score on point-scale examination																
	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	Total.
25–29								1			1						2
20–24	1						1	2	2	1	2						9
15–19	1			2	1	2	9	4	7	8	5		1		1		41
10–14	3	1	3	2	11	11	13	9	10	11	8	1	5	1			89
5– 9	8	2	5	8	10	12	21	11	8	6	8	4		1			103
0– 4	10	4	3	6	9	14	19	11	7	5	3	3				1	95
Total	23	7	11	18	31	39	63	38	34	31	27	8	6	2	1	1	340

The question of the manner in which the intelligence of the negro differs from that of the white man is of much less immediate practical importance from the point of view of the military organization than the question of the degree to which it differs. The amount of available data bearing on the qualitative aspect of the negro's intelligence is correspondingly less full and illuminating. The Hollerith principal sample offers no material for a consideration of this question. The most complete camp studies which attack the problem of the differential analysis of white and negro mentalities are those from Camps Sevier, Funston, and Dix. It has already been noted that the Camp Sevier report considered the negro strong in the use of language and that in this camp there was developed a method of giving beta with verbal instructions.

In the Camp Sevier report (November 16, 1918) the comparison between negroes and whites is made by taking "200 cases of negroes and 200 cases of whites: (1) Distributed within the letter ratings in the same proportions as those ratings exist in the total negro draft, i. e., so chosen as to have the same percentage of A's, B's, C's, etc., as in the total negro draft of 1,762 men; and (2) with each negro case paired off with a white making the same total score, i. e., each negro total score of 8, 20, 40, etc., paired off with a white total score of 8, 20, 40, etc. Thus this material compares equal amounts of negro and white intelligence typical of the total amount of intelligence of the whole negro draft." This is done for alpha and beta. For comparison of results on the performance scale 82 cases of negroes are paired off with an equal number of cases of whites of equal mental age, and for the point scale examination the results of 188 cases of negroes and whites are similarly treated. The average score made by negroes on the separate tests of the different examinations are compared with the average scores made by the corresponding whites. The comparison is expressed in terms of the percentage of white score made by negroes. The results are given in table 273, which gives opposite the name of each test the percentage of white score made by the negroes. In the tests of alpha and beta there are given also the percentage of white score made by Negroes of C and D grade separately. C includes also C+ and C−, and D includes also D−. Four A's and B's are included in the entire group, but are not treated as a separate group. Taking the results at their face value, the negroes excel the whites in the the synonym-antonym and range of information tests of alpha; the picture completion test of beta; the free association test, using three words in one sentence, definition of abstract terms, and analogies in the point scale examination; and in the manikin and feature profile and designs from memory of the performance scale. They are inferior to the whites in the arithmetic, judgment, and number series completion tests of alpha; the cube analysis, X–0 series, number checking, and geometrical construction tests of beta; the repetition of sentences, designs from memory, and absurdities of the point scale examination, and in the maze of the performance scale. The negroes are inferior in the memory for designs in the point scale (test 16) and superior in the designs test of the performance scale (test 6). The report suggests that the high score in the latter test is probably due to the fact that the first designs, in which the negro makes his points, are simple, and there is a gradual transition from simple to complex. The report takes the above results to indicate that the negro as compared with the white man of equal intelligence is relatively strong in the use of language, in acquaintance with verbal meanings, and in perception and observation; and that he is relatively weak in judgment, in ability to analyze and define exactly, and in reasoning.

Camp Funston (October, 1918) reports the results of the examination of 938 negro recruits by the Stanford-Binet scale. Their mental age ratings range between 5 and 9 years, with considerably over two-thirds the total number making either 6 or 7 years mentally. For comparative purposes the results of these examinations are presented together with those of 351 white recruits also tested by the Stanford-Binet scale at Camp Funston. The white recruits rated between 6 and 10 years mentally, a large majority rating either 8 or 9 years.

TABLE 273.—*Percentage of white score made by negroes of equal intelligence rating (Camp Sevier).*

	Test.	C.	D.	Entire.
Alpha.	1. Commands	94.2	90.9	94.5
	2. Arithmetic problems	87.7	90.6	88.5
	3. Judgment	99.2	84.6	89.4
	4. Synonym-antonym	124.6	160.0	129.9
	5. Disarranged sentences	96.8	123.1	100.5
	6. Number series	91.1	84.6	91.4
	7. Analogies	89.6	77.8	93.2
	8. Information	114.6	115.8	114.2
Beta.	1. Maze	84.5	108.5	104.4
	2. Cube analysis	86.3	86.2	89.8
	3. X-o series	118.1	69.8	81.1
	4. Digit symbol	99.5	110.7	107.3
	5. Number checking	107.7	84.5	90.2
	6. Picture completion	109.0	120.9	117.6
	7. Geometric construction	77.4	84.9	82.3
Performance scale.	II. Manikin and feature profile			120.0
	IV. Cube construction			98.3
	VI. Designs			113.8
	VII. Digit symbol			108.0
	VIII. Maze			62.0

	Test.	Entire.
Point scale.	1. Esthetic comparison	98.3
	2. Missing parts	105.1
	3. Lifting weights	100.5
	4. Digits	103.0
	5. Counting backward	91.9
	6. Memory for sentences	72.1
	7. Description of picture	100.9
	8. Arrangement of weights	101.3
	9. Difference	97.1
	10. Definition	97.2
	11. Resistance to suggestions	91.7
	12. Square and diamond	106.6
	13. Free association	166.6
	14. Three words in sentence	155.0
	15. Questions	94.1
	16. Designs from memory	77.0
	17. Absurdities	72.6
	18. Sentence construction	100.0
	19. Definition of abstract terms	111.2
	20. Analogies	119.5

Table 274 (negroes) and table 275 (whites) show the percentages of men passing each test at each mental age. The tests are arranged in order of difficulty from easiest to most difficult, as determined by the total number of passes, including assumed passes below the basic year and assumed failures above the year in which no tests were passed. Table 276 arranges for ease in comparison the respective performances of negroes and whites in certain tests in which there is indication of superiority or inferiority of negroes to whites.

TABLE 274.—*Number of cases passing each test at each mental age, Stanford-Binet scale, 938 Negroes, Camp Funston.*

	Test.	5.0–5.9	6.0–6.9	7.0–7.9	8.0–8.9	9.0–9.9	Total, 938. Success.	Failure.	Rank.
	Number of cases at each mental age	76	275	416	138	33	.....	.....	.....
VI	1. Right and left	69	267	415	138	33	922	16	1
	2. Missing parts	14	184	373	123	33	727	211	6
	3. 13 pennies	40	247	413	138	33	871	67	2
	4. Comprehension	28	210	393	135	33	799	139	4
VII	2. Picture description	10	61	152	69	29	321	617	9
	5. Differences	54	238	418	136	33	869	69	3
	6. Diamond	8	33	128	59	31	259	679	12
	Alt. 3 digits backward	3	30	165	89	31	318	620	10
VIII	1. Ball and field	11	85	268	110	28	502	436	8
	2. 20–1	0	7	83	67	32	189	749	16
	3. Comprehension	22	193	361	134	33	743	195	5
	4. Similarities	4	85	284	125	33	531	407	7
IX	1. Date	.....	3	93	82	30	211	727	14
	2. Weights	.....	8	97	78	27	210	728	15
	3. Change	.....	13	134	101	33	281	657	11
	4. 4 digits backward	.....	3	17	26	18	64	874	18
X	2. Absurdities	.....	0	17	33	24	74	864	17
	3. Designs	.....	0	7	0	7	14	924	22
	5. Comprehension	.....	2	75	108	32	217	721	13
	6. 60 words	.....	0	5	12	27	44	894	19
XII	3. Ball and field	.....	.....	.....	5	24	29	909	21
	5. Fables	.....	.....	.....	0	0	0	938	25
	6. 5 digits backward	.....	.....	.....	0	3	3	935	24
	7. Pictures	.....	.....	.....	1	30	31	907	20
	8. Similarities	.....	.....	.....	2	3	5	933	23

The results of the Funston report in part confirm those of the Sevier report. This is especially true of the free association test. For purposes of comparison the tests of the Stanford-Binet scale in which the negroes are superior or inferior to the whites are listed here. The percentage of white score made on corresponding tests of the point scale examination are also given where such corresponding tests exist.

The negroes appear as superior to the whites in free association and inferior to them in counting backwards in both investigations. The negroes show slight superiority also in the arrangement of weights. In the other tests the results are contradictory or doubtful.

TABLE 275.—*Number of cases passing each test at each mental age, Stanford-Binet scale, 351 whites, Camp Funston.*

Test.	6.0–6.9	7.0–7.9	8.0–8.9	9.0–9.9	10.0–10.9	Total, 351. Success.	Failure.	Rank.
Number of cases at each mental age	27	67	111	104	42	.....	.....	.....
VI. 1. Right and left	27	65	111	104	.....	349	2	2
VI. 2. Missing parts	13	57	110	104	.....	326	25	5
VI. 3. 13 pennies	26	67	111	104	.....	350	1	1
VI. 4. Comprehension	16	66	111	104	.....	339	12	3
VII. 2. Picture description	11	36	86	94	41	268	83	8
VII. 5. Differences	20	63	110	104	42	339	12	4
VII. 6. Diamond	6	36	90	99	42	273	78	7
Alt. 3 digits backward	5	32	84	98	41	260	91	10
VIII. 1. Ball and field	7	31	77	87	41	243	108	12
VIII. 2. 20-1	3	21	76	95	39	234	117	13
VIII. 3. Comprehension	15	57	106	104	42	324	27	6
VIII. 4. Similarities	8	35	85	98	42	268	83	9
IX. 1. Date	2	16	66	85	40	209	142	14
IX. 2. Weights	2	13	50	66	36	167	184	16
IX. 3. Change	2	26	87	97	42	254	97	11
IX. 4. 4 digits backward	0	3	18	50	34	105	246	18
X. 2. Absurdities	.....	5	28	65	37	135	216	17
X. 3. Designs	.....	0	14	25	18	57	294	20
X. 5. Comprehension	.....	14	54	85	34	187	164	15
X. 6. 60 words	.....	3	7	16	23	49	302	22
XII. 3. Ball and field	.....	.....	6	37	23	66	285	19
XII. 5. Fables	.....	.....	0	1	5	6	345	25
XII. 6. 5 digits backward	.....	.....	2	3	7	12	339	24
XII. 7. Pictures	.....	.....	11	17	25	53	298	21
XII. 8. Similarities	.....	.....	0	21	19	40	311	23

TABLE 276.—*Relative successes of whites and negroes in Stanford-Binet tests, shown by percentage of men passing.*

WHITES SUPERIOR.

Test.		Rank.	Mental age. 5	6	7	8	9	10
Number of cases	Whites	.....	.....	(27)	(67)	(111)	(104)	(42)
	Negroes	.....	(76)	(275)	(416)	(138)	(33)	.....
VII.—6. Diamond	Whites	7	.....	22	54	81	95	100
	Negroes	12	10	12	31	43	94	.....
VII.—2. Picture description	Whites	8	.....	41	54	77	90	98
	Negroes	9	13	22	36	50	88	.....
VII.—Alt. 3 digits backward	Whites	10	.....	18	48	77	94	98
	Negroes	10	4	11	40	64	94	.....
VIII.—2. 20-1	Whites	13	.....	11	31	68	91	93
	Negroes	16	0	2	20	48	97	.....

NEGROES SUPERIOR.

Test.		Rank.	5	6	7	8	9	10
VIII.—1. Ball and field	Whites	12	.....	26	46	69	84	98
	Negroes	8	15	31	64	80	85	.....
X.—5. Comprehension	Whites	15	.....	0	21	49	82	81
	Negroes	13	.....	1	18	78	97	.....
IX.—2. Weights	Whites	16	.....	7	19	45	63	86
	Negroes	15	0	3	23	57	82	.....
XII.—3. Ball and field	Whites	19	.....	.....	.....	5	35	55
	Negroes	21	.....	.....	0	4	73	.....
XII.—7. Picture description	Whites	21	.....	.....	.....	10	16	59
	Negroes	20	.....	.....	0	4	91	.....
X.—6. 60 words	Whites	22	.....	0	4	6	15	55
	Negroes	19	.....	0	1	9	82	.....

NEGROES SUPERIOR.

Test.	Stanford-Binet.	Point scale.
VIII.—1. Ball and field	.....	.....
X.—5. Comprehension	15	94.1
IX.—2. Weights	8	101.3
XII.—3. Ball and field	.....	.....
XII.—7. Picture description	7	100.9
X.—6. 60 words	13	166.6

NEGROES INFERIOR.

Test.	Stanford-Binet.	Point scale.
VII.—6. Diamond	12	106.6
VII.—2. Picture description	7	100.9
VII.—Alt. 3 digits backward	.....	.....
VIII.—2. 20-1	5	91.9

Camp Dix (October 31, 1918) makes a comparison of the results on alpha and beta examinations of negroes and whites and states that "it is the obvious conclusion of this study that the difference (between whites and negroes) is chiefly quantitative and not qualitative. This conclusion is suggested by the close parallelism of scores in performance in the group psychological examinations. This parallelism persists whether the analysis is made from the point of view of total scores, scores in the individual tests, correlations, or distributions. The inferiority is almost invariably constant at a lower level than the standards of whites."

Tables 277 and 278, taken from this report, compare the results of negroes and whites on the individual tests of alpha and beta, respectively. The comparison is made in three ways. The coefficients of correlation for score on each individual test with total score, mean scores, and percentage of zero scores are all given for negroes and whites, respectively. In alpha 1,239 negroes are compared with 5,178 whites. In beta 500 negroes are compared with 2,276 whites. No comparison of negroes and whites on the basis of results of individual examinations is made in this report.

TABLE 277.—*Comparison of negroes and whites on individual alpha tests, Camp Dix.*

In case of whites the coefficients of correlation are based on the old method of scoring in which weighted scores were used.

Test.	Coefficients of correlations with total score.		Mean score.		Per cent zero score.	
	Negro.	White.	Negro.	White.	Negro.	White.
1	0.76	0.79	3.2	4.3	15.1	7.2
2	.76	.82	5.8	7.6	4.5	2.1
3	.83	.83	3.9	5.9	25.0	11.3
4	.88	.83	6.6	9.2	36.0	26.9
5	.81	.79	5.4	7.2	25.8	20.4
6	.77	.78	3.8	5.9	27.6	14.7
7	.81	.76	4.5	7.2	31.5	17.8
8	.88	.85	9.1	14.2	16.3	6.4

TABLE 278.—*Comparison of negroes and whites on individual beta tests, Camp Dix.*

In case of whites the coefficients of correlation are based on the old method of scoring in which weighted scores were used.

Test.	Coefficients of correlations with total score.		Mean score.		Per cent zero scores.	
	Negro.	White.	Negro.	White.	Negro.	White.
1	0.78	0.67	1.5	2.1	26.8	17.8
2	.75	.64	3.6	5.1	20.2	14.7
3	.79	.78	2.5	5.3	22.2	9.7
4	.86	.62	4.3	8.0	31.4	12.0
5	.85	.78	4.1	8.1	34.0	19.8
6	.80	.80	6.7	9.8	9.8	5.2
7	.77	.80	1.8	3.0	46.4	28.8

Altogether the evidence from camp reports seem to indicate, however, that qualitative differences between negroes and whites do exist. Whether these differences are sufficiently marked to make the measures of intelligence developed for use with white men inexact as applied to negroes is still to be determined.

The only available data collected with the purpose of attacking the question of the military value of the negro are those contained in a report from Camp Upton (November 10, 1918). Company commanders were requested by the chief psychological examiner to make out, with the assistance of their lieutenants and first sergeants, a list of 50 negro recruits, 10 of whom, in the estimate of the officers and sergeant, fell in each one of five designated classes by reason of their military value. The classes with their designations were as follows:

A. Very superior. Equal to good white sergeant or to white officer material.

B. Superior. Level of good white noncoms.

C. Level of good white privates; the large average group of the white draft.
D. Inferior. Only just good enough to make a satisfactory soldier.
E. Very inferior. Too poor to make a satisfactory soldier.

If there were not as many as 10 men who fell certainly within the A group or the E group, as many were to be reported as seemed capable of certain classification in these groups. A rating on military value in relation to white troops was expressly asked for, since what was desired was an estimate of the absolute rather than of the relative value of the men. Such ratings were requested from two different groups of drafted negroes.

From this procedure there resulted 238 negro cases for which the examiner had both a rating on military value and a psychological rating. The following is the correlation table for these two ratings, for which the coefficient of correlation is 0.60.

Military value.	Intelligence rating.							Total.
	A.	B.	C+.	C.	C−.	D.	D− and E.	
A	0	2	0	1	.....	.....	.....	3
B	3	6	7	15	11	7	.....	49
C	.....	4	9	20	21	5	.....	59
D	.....	1	8	8	21	25	4	67
E	.....	.....	1	3	8	34	14	60
Total	3	13	25	47	61	71	18	238

$r=0.60$.

The results of the investigation are summarized as follows:

(*a*) Less than 2 per cent of negroes are of A value to the military service when compared with white troops.

(*b*) About 25 per cent are considered by their officers as "too poor to make a satisfactory soldier." Most of these are D intelligence or less.

(*c*) Nearly all the negroes who rate D− or E in intelligence and about half of those who rate D in intelligence are reported as "too poor to make a satisfactory soldier."

(*d*) D− intelligence is seldom more than just barely satisfactory.

Written comment was invited from the officers who made the ratings and their responses are summarized as follows:

(*a*) All officers without exception agree that the negro lacks initiative, displays little or no leadership, and can not accept responsibility. Some point out that these defects are greater in the southern negro.

(*b*) All officers seem further to agree that the negro is a cheerful, willing soldier, naturally subservient. These qualities make for immediate obedience, although not necessarily for good discipline, since petty thieving and venereal disease are commoner than with white troops.

A confirmation of correspondence between psychological ratings and officers' estimates of military value of negroes at the lower end of the scale is contained in a report from Camp Taylor (October 1, 1918). Two hundred and twenty-one negroes of the Eight hundred and fourteenth Pioneer Infantry were referred to the psychological board by the camp surgeon, these men having been selected by their company commanders as those who were inapt and slow and not able to drill. These men were given psychological examinations and 109 of the 221 were found mentally unfit for military service. The remainder were recommended for development battalion. None rated higher than 7.8 years mentally.

In the case of white recruits a high correlation has been found to exist between psychological rating and military value. The report from Camp Upton indicates that the same is true in the case of negroes, and that just as they are inferior to the whites in intelligence, so also are they inferior in their value to the military service. It should be noted that estimates of the military value of the negro are available for correlation with intelligence ratings only from officers who have observed the men in camp and during their training period. The question of the military value of the negro fighter when he gets actually into action may well be quite a separate one and it is at all events one which our present data do not enable us to discuss.

CHAPTER 9.

LITERACY.

Information on illiteracy in the drafted army was obtained only incidentally as it was indicated by the type of examination given recruits. The beta examination was developed primarily for men who could not read and write English and was used for these men in place of the alpha examination which presupposes English literacy. The percentages of men taking the beta examination are available, but unfortunately the method of segregation for beta in different camps and at different times differed greatly, so that no positive definition of illiteracy can be laid down on this basis.[1] Without a definition, statistics of illiteracy are meaningless for men vary by all degrees from inability to sign their names or to read even digits up to degrees of ability that would be classed as literate by anyone. In general it may be said that many of the camps aimed at an "ability to read and understand newspapers and write letters home" as a basis for the alpha examination, and that the figures for the numbers of men taking beta do approximately reflect this level of literacy. Unfortunately, however, the degree of adequacy with which the intended separation was made depended on chance conditions, such as the skill of a sergeant who separated the men, the presence of an interpreter, the time available for segregation, or even, perhaps, the immediate availability of space in the beta examination room. Camp conditions were rough and examining procedure was constantly being adapted to meet the ever-present emergency. The figures for men taking beta, given in this chapter, are rather the figures for the "less literate" in the drafted army than for the illiterate in any strictly defined sense of the term.[2]

Notwithstanding these limitations the extent of illiteracy among the drafted men is a striking fact. The figures for beta are not an exact measure of this fact, and it is equally obvious that without a more definite measure of literacy and a uniform standard for the segregation of groups detailed statements are impossible. Nevertheless these measures, though rough and varied, do indicate conditions of serious public concern.

The weekly statistical reports to the Surgeon General's Office from the camps give the numbers of men taking the beta examination. The usual basis of separation for beta was "ability to read and understand newspapers and write letters home." In a number of camps, however, an educational qualification (four, five, or six years' schooling) was added, and in a few camps an educational qualification alone was used. Table 279 indicates, for 28 stations in which extensive examination was carried out, both the basis on which a man was considered literate, and the number and per cent of all men examined whom it was found necessary to send to the beta examination for illiterates. The extent of illiteracy is often largely dependent on the proportion of negroes in the group; this is therefore indicated in the final column. The figures cover the period from April 27, 1918, to the close of examining.

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[1] See section on camp organization in Part I, chapter 3, section 6 (pages 62 to 87), and the chapter on methods of segregation, Part II, chapter 5, especially section 1 (pages 347 to 355).

[2] Very roughly the figures for beta correspond to a literacy of the fifth grade or less, although the variation about this point is great. It is evident that to call fifth or fourth grade literacy "illiteracy" is to use the term "illiteracy" in a very different sense from the usual usage. The United States Bureau of the Census classifies as illiterate any one 10 years of age or over reporting themselves as unable to write. (See Abstract of the Thirteenth Census of the United States, Washington, 1913, p. 239.) This classification is quite as indefinite as the segregational division in the psychological service, but it represents presumably a much lower degree of literate ability.

TABLE 279.—*Numbers of men given examination beta, as bearing upon the literacy of recruits.*

Station.	Literacy basis.[1]	Number examined.	Number sent to beta.	Per cent beta.	Per cent negro.
Bowie	Read and write, finished fourth grade	27,464	5,497	20.0	10.7
Cody	Fourth grade	43,482	5,003	18.8	0
Custer	Read and write; negroes, 5 years at school	54,354	10,004	18.4	9.9
Devens		50,031	11,370	22.7	1.7
Dix	Read and write	67,768	19,768	29.2	19.8
Dodge	Read easily, sixth grade	69,927	22,701	32.5	25.4
Funston	Read and write, finished fourth grade	75,678	21,967	29.0	25.5
Gordon	Read and write	63,648	16,119	25.3	10.8
Grant	Read and write rapidly, or seventh grade	83,229	24,218	29.1	18.8
Greene	Read and write, 4 years at school	27,807	10,512	37.8	38.6
Greenleaf	Read and write, fourth grade, and 5 years in United States	56,067	9,992	17.8	0.8
Hancock	Read and write fairly, reached sixth grade	44,433	12,714	28.6	5.1
Humphreys		13,681	1,957	14.0	0
Jackson	Read and write	98,996	19,587	19.8	17.5
Kearney	Read and write, speak English, and over fifth grade	18,921	2,931	15.5	.005
Lee		82,441	23,104	28.0	8.8
Lewis	Read and write	75,519	10,209	13.5	2.2
Logan	Read and write	19,984	3,679	18.4	0.3
Meade	Reached fifth grade	65,700	21,069	32.1	20.8
Pike	Read and write	75,942	21,891	28.8	16.1
Sevier	Four years at school (later, 6 years at school)	24,139	6,567	27.2	18.7
Sheridan	Read and write (later, 6 years at school)	55,165	11,985	21.7	10.0
Sherman	Sixth grade; negroes, 8 years at school	64,408	26,938	41.8	30.4
Taylor	Read and write; negroes, finished sixth grade	53,336	10,672	20.0	16.9
Travis	Read and write	77,555	17,403	22.4	22.0
Upton	Read newspapers	61,559	14,486	23.5	15.4
Wadsworth	Northern recruits, third grade; southern recruits, fourth grade.	67,704	13,442	19.9	6.0
Wheeler	Read and write, reached sixth grade (later, seventh grade)	32,988	10,411	31.6	10.9
Total		1,552,256	386,106	24.9	14.2

[1] "Read and write" means "ability to read and understand newspapers and write letters home."

A number of special reports from camps give comparative data of various sorts. Although an absolute definition of literacy is still lacking, the results within a single camp give more valid comparisons than data including several camps.

The following table from Camp Devens shows for New England and for each New England State the per cent of the draft who were given beta. Figures are given for the native-born, foreign, and negro groups separately. These per cents are not comparable with those in table 279, for they include besides the men originally sent to examination beta also those who failed in the alpha examination for literates and were subsequently given examination beta.

Group.	Maine.	New Hampshire.	Vermont.	Massachusetts.	Rhode Island.	Connecticut.	All New England.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Native born	24.4	22.1	17.7	11.5	15.6	9.0	16.3
Foreign born	63.8	71.1	71.1	57.1	74.8	73.4	62.6
Negro	77.8	.....	.....	86.3	55.5	42.8	79.5
Total	29.4	37.3	26.4	29.6	35.0	37.8	31.0

A general statement from Camp Jackson gives the percentages of men given examination beta for northern white, southern white, foreign-born, and negro recruits:

Northern recruits	7.9
Southern recruits	36.5
Foreign born	58.3
Negro	83.0

Camp Grant reports that (including those who failed on examination alpha) 44 per cent of northern negroes and 72 per cent of southern negroes were given examination beta. Of the latter group 30 per cent had already been eliminated by the physical examiners.

A special report on the negroes examined at Camp Upton shows the following per cents originally segregated as unable to take the alpha examination for literates:

New York City	18.9
New York (outside New York City)	25.3
New Jersey	27.5
Delaware	38.5
Virginia	52.4

In view of the importance of problems of Americanization the following table comparing the English acquirements of men from different European countries is of particular interest. From some countries the number of cases is small and the figures somewhat unreliable, but the larger differences between nationalities appear consistently at various camps. Figures are percentages of men given beta only.

Country.	Camp Devens.	Camp Custer.	Country.	Camp Devens.	Camp Custer.
England	7.1	.....	Portugal	83.6	.....
Scotland	7.1	.....	Italy	81.7	77.8
Ireland	39.2	.....	Poland	84.0	66.7
Canada	57.0	.....	Lithuania	89.5	.....
Norway	48.6	61.6	Finland	60.9	41.0
Sweden	41.7	58.0	Russia	73.6	62.8
Denmark	27.3	62.5	Greece	75.6	53.0
Holland	.....	17.0	Turkey	81.3	83.4
Belgium	.....	73.0	Armenia	72.9	.....
Germany	12.7	.....	Syria	74.2	.....
Austria	48.8	39.0			

A special report from Camp Upton gives more detailed data on 2,338 cases from the New York City draft. The following definitions were laid down for the classes listed in the table below:

"Literate: Fair"—men given examination alpha because stating an ability to read "American newspaper."

"Literate: Poor"—men less literate than the above, but who can write their age, name, home town, and occupation without help even though with misspellings—i. e., the men who were given examination beta but who were able to fill in the information at the top of the examination form without help from the orderlies.

"Illiterate: English"—men who can not fill in the information on the beta examination blank but who can furnish the information to the orderly by question and answer in English.

"Illiterate: Non-English"—men who can not furnish the required information for the beta examination blank except by aid of an interpreter.

"Low-grade feeble-minded"—men recommended for discharge from the Army on the ground of mental deficiency; in general, men with a mental age of less than nine years.

Literacy classification.	Number of cases.	Per cent.
American born:		
Literate, fair	1,383	85.4 (given alpha).
Literate, poor	212	13.1 (given beta).
Illiterate, English	24	1.5 (given beta).
Illiterate, non-English	0	0
Low-grade feeble-minded	7	.4 (given beta).
Total	1,619	100.0
Foreign born:		
Literate, fair	230	32.0 (given alpha).
Literate, poor	256	35.6 (given beta).
Illiterate, English	185	25.8 (given beta).
Illiterate, non-English	48	6.6 (given beta).
Low-grade feeble-minded	30	4.2 (given beta).
Total	719	100.0
Total American and foreign:		
Literate, fair	1,613	69.0 (given alpha).
Literate, poor	468	20.0 (given beta).
Illiterate, English	209	9.0 (given beta).
Illiterate, non-English	48	2.0 (given beta).
Low-grade feeble-minded	37	1.6 (given beta).
Total	2,338	100.0

The following brief report from Camp Wadsworth was requested by the camp personnel adjutant in order to furnish information for the Commission on Illiteracy of South Carolina.

For the practical purposes of giving one kind of psychological examination to those who can read and write English and of giving another kind of psychological examination to those who are unable to read and write English, illiteracy is defined as follows: All those who can not read and write their own letters, who can not read English newspapers, or who have only been one or two years in American public schools are illiterate. This illiteracy may be due to foreign parentage, lack of education, or inferior intelligence.

The percentage of illiteracy for various localities represented in recent draft examinations is as follows:

Locality.	Date of draft.	Number examined.	Number illiterate.	Percentage of illiteracy.
New York State	May 25, 1918	8,965	1,484	16.6
South Carolina	July 5, 1918	981	487	49.5
Minnesota	July 24, 1918	4,692	670	14.2

The above figures are most significant in light of the fact that the drafted men from New York State include many foreigners. In spite of that fact the percentage of illiteracy (16.6 per cent) seems to be very small when compared with the percentage of illiteracy found among the men reporting from South Carolina. In fact the percentage for the latter group was found to be so high as to make us doubt the accuracy of the data. A check was therefore made as follows: The records of all South Carolina men in one company were analyzed, with the result that of the 177 men in the company 109, or 61.6 per cent, were illiterate. It seems from this check that the percentage of illiteracy (49.5 per cent) for the whole group from South Carolina is probably correct.

Such a percentage of illiteracy as is found among the men from South Carolina is startling. Among Virginia negroes reporting at Camp Lee, Va., in the fall of 1917 the percentage of illiteracy was 40 per cent. The conclusion is that the problem of illiteracy among South Carolina drafted men is a most serious one.

CHAPTER 10.

STATISTICS ON EDUCATION AND ITS RELATIONS TO INTELLIGENCE EXAMINATIONS.

SECTION 1.—*The schooling of the Army.*

The principal Hollerith samples of a number of groups in the Army of the United States have been analyzed in various ways in order to learn the degree of schooling attained by men in the Army and to discover as far as possible any dependence of schooling on intelligence or of intelligence scores on schooling. Records for each group were sorted according to the numbers of years (or grade) of schooling reported and then by intelligence scores, giving 22 Hollerith tables. The resulting tables (Nos. 280 to 301) are presented herewith. Six projected tables do not appear because the cases in each were too few.

TABLE 280.—*Variables: Alpha × schooling. Group VI: White officers.*

Officers who took alpha only.

Alpha score.	No schooling.	Grades.							High school.				College.											Total.
		1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5	6	7	8	9	10	11	12	
205–212														1	1	1	7			1						11
200–204				1								1		2		4	14	2	2	3						28
195–199								1				2	5	1	5	8	55	6	4	6	2	1				96
190–194										1	1	2	10	5	15	18	69	14	9	3	6	1				154
185–189				1					1	4	5	7	14	12	19	25	112	19	13	9	7	1	1			250
180–184							1	1	6	3	3	8	25	25	28	54	142	21	12	16	16					361
175–179			1			1		1	1	3	5	3	30	25	44	55	163	20	23	25	11	3				414
170–174							1		3	2	5	10	47	30	54	77	228	32	16	24	11	1	2			543
165–169	1				1	1			4	8	17	17	69	39	63	91	213	31	29	23	13	2				622
160–164					1			1	11	10	21	18	57	33	69	96	217	37	36	11	15	3	2	1	2	671
155–159				2			1		8	8	19	17	82	49	81	98	267	37	27	17	15	4				732
150–154					1		2		15	8	22	30	85	38	93	119	252	34	31	28	14	1				773
145–149				3			1	3	16	13	33	29	86	48	86	116	228	41	35	27	18	1				784
140–144				1	2	2	2	2	15	8	25	22	87	44	73	100	210	46	29	22	15	1				736
135–139	1			3	2	2		3	18	21	21	31	70	49	91	94	227	37	35	22	10	1	1			742
130–134				1	1	2	2	3	5	16	13	31	32	90	52	82	95	221	29	39	21	21	2	1			761
125–129								3	1	24	15	25	26	80	30	66	81	183	25	29	14	13	3	1			619
120–124				1	2	2	1	1	4	21	24	36	22	81	55	78	100	188	23	27	16	10	2	1			695
115–119				1	3		4	5	27	17	25	27	57	27	60	68	162	26	30	13	11	1				564
110–114				1		2	3	4	29	23	27	33	55	38	53	51	131	15	23	7	16		1			512
105–109					1	2	3	3	24	15	20	27	51	30	49	47	133	24	16	9	8	1				463
100–104	1					1	4	4	38	22	22	27	48	26	24	31	96	18	21	9	9	1	2			404
95–99			2	1	1	1	4	3	23	11	21	17	32	18	38	48	87	11	18	2	5	1	2			346
90–94				1		3	2	7	22	11	19	17	24	17	15	29	64	10	8	7	5					261
85–89				1	1	1	4	4	26	14	13	9	19	9	26	24	57	6	6	6	3			1		230
80–84			1			3	3	1	25	10	14	8	21	7	17	27	42	10	14	2	2	1				208
75–79	1				2		1	2	12	12	14	4	15	7	14	12	31	5	6	3	3					144
70–74				1	1		2	3	18	11	6	3	12	3	5	12	12	6	3	2						100
65–69						2		1	5	9	7	5	10	1	7	12	24	3	7							93
60–64							3		8	5	4	4	2	2	7	10	14	2	6	1	1			1		70
55–59						1	1	3	14	2	1	4	3	1	2	9	13	4	1		1					60
50–54	11	1			1	1			7	5		3	2	1	1	3	14	1	3	1						55
45–49				1			2	6	5	1	1	1	3	1	2	3	7		2		2					36
40–44						2			2	2	1	1	1		1		2									11
35–39					1	2			2		1	1	1		1	1	3	1								13
30–34				1			1		2	2					1		4		1							12
25–29								1					1				1				2					5
20–24						1			1	1																3
15–19							1									1	1									3
10–14																										0
5–9						1																				1
0–4																										0
Total	15	1	6	20	22	32	52	64	448	318	471	468	1,275	726	1,271	1,620	3,954	596	561	350	265	32	14	3	2	12,586

TABLE 281.—*Variables: Alpha score × schooling. Group I, II, III: White draft (native born).*

For men who took alpha only.

Alpha score.	No schooling.	Grades.								High school.				College.								Total.
		1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5	6	7	8	
205-212										1												1
200-204																1	2					3
195-199										1		1		2	1	1	5	1	1		1	14
190-194												2	3	1	2	2	5		1		1	17
185-189									1	2	3	2	9	4	4	4	17	2	1	1		50
180-184									2	2	6	4	15	2	3	2	19	1				56
175-179				1				2	5	4	6	4	15	9	8	6	23	2	1			86
170-174				1	3			1	2	5	6	10	11	22	9	13	12	36	5	1	1	138
165-169			1	1	1	1	3	3	8	8	7	10	38	16	14	14	38	1	2		1	167
160-164					1		2		12	18	12	10	48	25	18	17	44	4	3	1		215
155-159			1		1		1	2	15	22	20	24	56	22	29	28	39	2	1	1		261
150-154			2	3	2	1	1	7	29	36	30	29	63	29	34	31	47	5	1			350
145-149				1	2			7	48	27	42	34	96	33	31	28	53	6	2			410
140-144				1	2	2		7	62	44	41	41	98	26	26	18	41	3				412
135-139			5	1		1	3	15	76	55	57	46	106	51	37	21	29	3	2			508
130-134	1		1	1	8	2	5	19	108	73	85	69	130	42	50	27	29	1	1			652
125-129		1	2	3	3	1	4	17	159	86	89	62	120	62	38	29	35	4	1	1	1	718
120-124		2		4	4	5	13	24	164	92	94	74	121	48	43	20	34	2	1	1		746
115-119		1	3	5	3	11	9	36	249	113	129	80	148	44	58	28	42	1				960
110-114	2		3		1	9	17	52	309	136	126	91	151	65	48	28		1	1			1,067
105-109	1	1	7	4	8	13	23	66	384	173	146	83	140	52	36	23	21	6	2			1,189
100-104	2	2	4	5	4	17	21	97	430	168	174	97	135	44	33	22	17	1				1,273
95- 99	1	1	3	1	7	24	60	141	523	199	148	95	135	58	25	24	26	2				1,473
90- 94	1	3	5	3	8	26	68	170	624	209	174	97	105	47	51	25	17					1,633
85- 89	1		4	5	23	41	71	187	661	230	201	107	110	55	35	21	10					1,762
80- 84	1	2	4	3	20	45	103	247	756	232	167	84	103	41	37	17	11	1				1,874
75- 79	1	4	4	8	23	71	123	326	811	248	137	82	87	39	29	9	6	3	2			2,013
70- 74		1	6	5	26	88	186	378	914	238	165	78	81	45	22	12	4	1	2			2,252
65- 69		2	3	9	29	102	222	385	957	225	131	57	70	29	29	13	13					2,276
60- 64	1	2	7	9	39	144	272	499	989	246	146	61	57	41	17	8	2					2,543
55- 59	3	2	8	18	58	203	306	594	1,057	178	114	38	33	38	16	11	2					2,679
50- 54	2	2	4	9	86	213	349	611	996	161	95	21	32	16	12	6	3					2,618
45- 49	1	2	4	30	85	295	425	650	937	143	73	24	18	23	11	8	3	2				2,734
40- 44	2	8	7	32	134	329	438	660	845	107	55	24	21	11	7	3		1	1			2,684
35- 39	4	5	12	35	167	392	514	638	706	88	49	27	14	17	3	1	1					2,673
30- 34	5	5	13	58	207	430	494	636	642	80	36	13	16	3	2	2	2					2,644
25- 29	3	5	20	54	274	429	456	511	461	45	31	12	11	2	3		2					2,319
20- 24	3	5	32	82	279	414	359	380	281	27	12	8	7	1	4	1						1,895
15- 19	9	6	23	99	286	379	289	231	189	10	16	4	8	4								1,553
10- 14	3	8	11	53	125	149	83	54	59	1	7	4					1					558
5- 9	5	6	15	52	128	104	44	44	31		2	1	1									437
0- 4	5	7	15	35	59	34	15	3	10	1	2											186
Total	57	83	229	631	2,106	3,975	4,980	7,701	14,518	3,736	2,838	1,614	2,423	1,056	829	523	707	60	26	6	4	48,102

TABLE 282.—*Variables: Beta score × schooling. Group I, II, III: White draft (native born).*

For men who took beta only or alpha and beta.

Beta score.	No schooling.	Grades.								High school.				College.						Total.
		1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5	6	
115-118	1						1													2
110-114				1			1		2											4
105-109						3				2		1			2	1	2			11
100-104	1	1	1	1	2	6	2	6	6	1		1		1			2			32
95- 99	1		3		3	4	9	3	13	1	3	3	1	1	1	1				47
90- 94	2	3	2	5	6	8	16	15	14	8	2		2	1						84
85- 89	1	1	5	16	18	18	24	15	26	6	2					1				133
80- 84	2	2	11	10	40	42	50	31	38	2	4	1	3	1		1	2			240
75- 79	5	3	1	26	58	61	65	63	46	3	2	2	3		1	1				340
70- 74	5	12	16	48	91	95	97	80	53	7	1	1	1	2						509
65- 69	10	16	18	61	136	123	118	93	70	10	3		4		2					664
60- 64	13	10	50	99	100	166	126	90	60	6	1		1			1				783
55- 59	17	21	60	107	185	173	100	101	58	4	1	2	2	1			1			833
50- 54	25	31	73	160	216	205	100	83	63	5	4	1	1	1	2					970
45- 49	49	41	65	139	217	168	109	70	62	11	4	2	2			2				941
40- 44	50	63	91	173	233	158	99	64	50	7	1	1	2			1			1	994
35- 39	91	42	92	146	194	135	80	53	41	5		2	1			1				863
30- 34	100	67	111	165	180	116	69	48	25	2		3	1		1		1			889
25- 29	103	89	123	146	183	105	56	36	39	7	1	2	1	2						893
20- 24	128	85	107	126	140	88	52	19	19		1	1	1							767
15- 19	83	61	64	83	79	57	21	20	4			1	1							474
10- 14	100	53	58	45	7	18	6	8	5											300
5- 9	46	38	28	21	20	13	11	2	4	2	1	2								188
0- 4	43	25	10	10	12	5	1	1												107
Total	857	664	989	1,588	2,180	1,767	1,213	903	698	88	31	25	29	9	9	9	3	1	1	11,068

TABLE 283.—*Variables: Score on performance scale examination × schooling. Group I, II, III: White draft (native born.)*

For men who took performance scale following alpha, or following beta, or following alpha and beta, or who took performance scale examination only.

Score on performance scale.	No schooling.	Grades.								High school.				College.				Total.
		1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	
200–209				1	2				1									4
190–199						1	2											3
180–189	1				1													2
170–179		3	2		1	2		1										9
160–169	6				1		1											8
150–159	4	1	1				1	2										9
140–149	5		2	1	2	1	2											13
130–139	6	3	1	1	1	3		1		1								17
120–129	5	3		3		1		2										14
110–119	4	3		1			1									1		10
100–109	4	3	3	3	1													14
90– 99	2	5	3	4	1		3	1										19
80– 89	13	1	3	2	2	1		1	1									24
70– 79	7	3	1	2	1		1											15
60– 69	3		4	3	2	3	1											16
50– 59	8	5	5	2		1	1											22
40– 49	6	1	1	1														9
30– 39	6	2		1	1													10
20– 29	1	1	1	1														4
10– 19	1	2			1	1												5
0– 9	2																	2
Total	84	36	27	26	17	14	13	8	2	1						1		229

TABLE 284.—*Variables: Score on point scale examination × schooling. Group I, II, III: White draft (native born).*

For men who took point scale following alpha, or following beta, or following alpha and beta, or who took point scale examination only.

Score on point scale.	No schooling.	Grades.								High school.				College.				Total.
		1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	
95– 99	1						1											2
90– 94						2				1								3
85– 89	1		2	1			1	1	1									7
80– 84	1				4	3												8
75– 79		2	1	1	1	1	1		1									8
70– 74	8	4	3	5	3	6	2	1	3								1	36
65– 69	4	2	5	6	6	4	1											28
60– 64	11	7	10	13	3	3	6	7										60
55– 59	10	15	12	3	4	5		4	1									54
50– 54	9	11	9	6	5	2	1	1	1	1								46
45– 49	7	3	6	3	3		1		1			1	1					26
40– 44	5	7	1	6	1	1	1	1										23
35– 39	2	7	1	3		1												14
30– 34	2		2		1											1		6
25– 29		1		1	2													4
20– 24		2																2
15– 19		1			1													2
10– 14																		
5– 9																		
0– 4																		
Total	61	62	52	48	34	28	15	15	8	2		1	1			1	1	329

TABLE 285.—*Variables: Mental age on Stanford-Binet examination × schooling. Group I, II, III: White draft (native born).*

For men who took Stanford-Binet following alpha, or following beta, or following alpha and beta, or who took Stanford-Binet examination only.

Score on Stanford-Binet scale.	No schooling.	Grades.								High school.				Total.
		1	2	3	4	5	6	7	8	1	2	3	4	
16.0–16.4										1				1
15.5–15.9	1								1					2
15.0–15.4	1							1			1			3
14.5–14.9						1		1		1		1		4
14.0–14.4					1			1	1					3
13.5–13.9							1							1
13.0–13.4									2					2
12.5–12.9					3		1							4
12.0–12.4				2	2	2	2							8
11.5–11.9	1			1	2		2	2	2					10
11.0–11.4	2	4	1	1	3	1	3	1	2					18
10.5–10.9	6		2	5	2	4		2			1			22
10.0–10.4	11	7	5	7	8	10	1	1	2					52
9.5– 9.9	14	7	14	10	11	3	3	3	1					66
9.0– 9.4	21	17	13	18	22	15	8	9	7		1			131
8.5– 8.9	16	17	14	13	7	4	2	1	2	1				77
8.0– 8.4	11	12	8	4	6	4	2		1					48
7.5– 7.9	8	5	1	3	4		2							23
7.0– 7.4	4	2	5	2	2	2			2	1				21
6.5– 6.9	3	2	1	2							1			8
6.0– 6.4	3		1	1		2								7
5.5– 5.9	1		1											2
5.0– 5.4	2	1							1					4
4.5– 4.9						1								1
4.0– 4.4				1										1
3.5– 3.9		1												1
Total	105	75	66	70	73	49	27	22	24	4	4	1		520

TABLE 286.—*Variables: Alpha × schooling. Groups I, II, III: White draft (native born).*

For men who took alpha only, or alpha and beta only, alpha and an individual examination, or alpha, beta, and an individual examination.

Alpha score.	No schooling.	Grades.								High school.				College.								Total.
		1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5	6	7	8	
205–212										1												1
200–204																1	2					3
195–199										1		1		2	1	5	1	1		1	1	14
190–194												2	3	1	2	2	5	1		1	1	17
185–189									1	2	3	2	9	3	4	4	17	2	1	1		50
180–184									2	2	6	4	15	2	3	2	19	1				56
175–179				1				2	5	4	6	4	15	9	8	6	23	2	1			86
170–174				1	3		1	2	5	5	10	11	22	9	13	12	36	5	1	1		138
165–169			1	1	1	1	3	3	8	8	7	10	38	16	14	14	38	1	2		1	167
160–164					1		2		12	18	12	10	48	25	18	17	44	4	3	1		215
155–159			1		1		1	2	15	22	20	24	56	22	29	28	39	2	1	1		264
150–154			2	3	2	1	1	7	29	36	30	29	63	29	34	32	47	5	1			351
145–149				1	2			7	48	27	42	34	96	33	31	28	53	6	2			410
140–144				1	2	2		7	62	45	41	41	98	26	26	18	41	3				413
135–139			5	1		1	3	15	76	55	57	46	106	51	37	21	29	3	2			508
130–134	1		1	1	8	2	5	19	108	74	85	69	130	42	50	27	29	1	1			653
125–129		1	2	3	3	1	4	17	150	86	89	63	120	62	38	29	35	4	1	1	1	720
120–124		2		4	4	5	13	24	164	93	94	74	121	48	43	20	34	2	1	1		747
115–119		1	3	5	3	12	9	36	249	113	129	80	149	44	58	28	42	1				962
110–114	2		3		1	9	17	52	311	136	126	91	151	65	48	28	28		1			1,069
105–109	1	1	7	4	8	13	24	66	385	173	146	84	140	52	36	23	21	6	2			1,192
100–104	2	2	4	5	4	17	21	99	431	169	174	97	136	44	33	22	17	1				1,278
95– 99	1	1	3	2	7	24	60	141	523	201	149	95	135	58	25	24	26	2				1,477
90– 94	1	3	5	3	8	26	68	173	626	209	175	97	105	48	51	25	17					1,633
85– 89	1		4	5	23	41	71	187	662	230	201	107	110	55	36	21	10	1				1,765
80– 84	2	2	4	3	20	46	103	248	757	233	167	85	103	41	38	17	11	1				1,881
75– 79	1	4	4	8	23	72	125	326	811	249	137	82	87	39	29	6	3	2				2,017
70– 74		1	6	5	27	92	188	379	916	238	166	78	81	45	22	12	4	1	2			2,263
65– 69		2	3	9	29	103	223	385	957	226	131	57	70	29	29	13	13					2,279
60– 64	1	2	7	10	40	145	275	505	990	246	146	64	57	41	17	8	2					2,556
55– 59	3	2	9	18	63	206	311	601	1,064	180	114	38	33	38	16	11	2					2,709
50– 54	2	2	4	11	88	215	353	619	998	162	95	22	33	16	12	6	3					2,641
45– 49	1	2	4	31	89	307	433	659	940	145	73	24	18	23	11	8	3	2				2,773
40– 44	2	8	7	33	138	349	445	669	851	107	55	24	21	11	7	3		1				2,731
35– 39	4	6	14	37	172	407	535	663	716	88	49	28	14	17	4	1	1					2,756
30– 34	5	5	15	61	218	448	519	651	656	82	37	13	16	3	2	2	2					2,735
25– 29	3	7	21	66	294	477	512	555	500	51	33	12	12	2	3		2					2,550
20– 24	7	8	36	101	331	475	445	442	314	37	15	8	7	1	4	1	1					2,263
15– 19	10	7	34	131	399	481	401	317	261	23	22	5	10	4								2,075
10– 14	10	15	36	145	313	396	247	191	149	7	11	5	2	2	2	3	1					1,535
5– 9	16	16	49	152	319	265	150	93	79	5	3	6	6	1								1,160
0– 4	17	17	26	88	159	94	45	19	28	3	3		1			2						502
Total	93	117	320	950	2,773	4,733	5,613	8,179	14,899	3,793	2,859	1,626	2,437	1,060	834	529	708	61	26	6	4	51,620

TABLE 287.—*Variables: Beta × schooling. Groups I, II, III: White draft (native born).*

For men who took beta only, or alpha and beta only, or beta and an individual examination, or alpha and beta and an individual examination.

Beta score.	No schooling.	Grades.								High school.				College.						Total.
		1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5	6	
115–118	1						1													2
110–114				1			1		2											4
105–109						3		2		1			2		1		2			11
100–104	2	1	1	1	2	6	2	6	6	1		1		1			2			32
95–99	1		3		3	4	9	3	13	1	3	3	1	1	1	1				47
90–94	2	3	2	5	6	8	16	15	14	4	2		2	1						84
85–89	1	1	5	16	18	18	24	15	26	6	2					1				133
80–84	2	2	11	10	40	42	50	31	38	2	5	1	3	1		1	2			241
75–79	6	3	1	26	58	61	66	63	46	3	2	3	3		1	1				343
70–74	5	12	16	48	91	95	98	80	54	7	1	1	1	2						511
65–69	10	16	18	61	136	123	119	93	71	10	3		4		2					666
60–64	13	10	50	99	160	166	126	91	61	6	1		1			1				785
55–59	17	21	60	109	185	173	100	103	60	4	1	2	2		1		1			839
50–54	25	31	73	161	217	205	100	84	64	5	4	1	1	1	2					974
45–49	49	42	65	140	217	169	109	70	62	11	4	2	2			2				944
40–44	50	63	91	173	234	160	99	66	50	7	2	1	3			1			1	1,001
35–39	72	42	92	147	196	137	81	53	42	5		2	1			1				871
30–34	100	70	111	167	182	117	70	48	25	2		3	1		1		1			898
25–29	109	91	125	148	186	106	56	36	41	7	1	2	1	2						911
20–24	142	93	118	136	149	93	59	24	21		1	1	1		1					838
15–19	131	94	93	114	102	75	30	23	10			1	1							674
10–14	172	95	96	82	35	34	14	14	8	1		1				1				553
5–9	94	76	50	41	29	18	13	3	6	3	1	2								336
0–4	68	42	28	10	17	8	4	3												181
Total	1,072	808	1,109	1,695	2,263	1,821	1,247	926	720	90	33	27	31	9	9	10	8	0	1	11,879

TABLE 288.—*Variables: Alpha × schooling. Groups I, II, III: White draft (foreign born).*

For men who took alpha only.

Alpha score.	No schooling.	Grades.								High school.				College.								Total.
		1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5	6	7	8	
205–212												1										1
200–204																						0
195–199																1						1
190–194																						0
185–189											1											1
180–184									1		1				1							3
175–179									1	1												2
170–174						1					1	1	2	2	1						1	9
165–169										2					2	3						7
160–164									1		1		2			2						6
155–159						2			1		2		2	1		1						10
150–154								1	1		2	2	1									7
145–149								2		3		1	4		2	3						15
140–144							1		7		5	4	1	1		3						23
135–139							2	1	6	3	1	2	2	2	1	2	1					24
130–134							1	2	8	1	5	5			2	1						25
125–129						1		1	4	6	2	3	2	3	1		1	1				26
120–124							1	2	1	9	3	4	3	6	1	2	2	1				37
115–119								3	6	17	5	4	3	4	3	1	1	4	1			52
110–114						1	1	1	4	11	7	7	1	8	3	2	1					47
105–109					4			5	5	25	5	8	6	2	4	2	2	2				68
100–104							2	2	9	19	11	7	9	6	1	1	2	4	1			74
95–99						2	2	7	14	27	5	9	2	7	6	3						84
90–94						2	4	8	12	38	8	10	2	5	5	2	2		1			99
85–89			1			1	5	13	31	39	8	9	3	5	2	3	1	2				123
80–84	1		1			2	8	10	27	45	15	10	5	6	4	2	2	3	1			142
75–79	1					8	6	13	21	46	11	12	4	6	1	3		2				137
70–74	1					4	10	17	21	41	16	11	6	4	5	3	2	2	1			144
65–69	1		1			7	11	24	23	59	13	10	7	1	2	1	2					162
60–64	1		1			6	13	32	43	49	19	10	6	5	1	2	2					190
55–59	2				2	3	18	36	35	48	12	10	4	8	1	3						182
50–54	2			4	5	9	22	30	50	60	7	14		7	4	3	1	2				220
45–49	2	2	3	3	11	32	33	29	70	9	12	5	8	2	2	1	1					225
40–44	1	1	4	7	22	37	48	58	56	12	6	5	8	1	1			1				258
35–39	2	2	3	6	30	39	39	37	48	8	7	8	1	1		2						233
30–34	1	2	4	8	30	31	49	35	44	8	7	6	2	2	2	1	1	1				234
25–29	2		3	16	41	31	44	35	41	7	3	3	4	3		1						234
20–24	1	1	2	22	25	45	43	13	33	7	2	2						1				197
15–19	2	2	1	9	21	19	23	14	13	2	1		1			2						110
10–14	2	1	4	12	11	11	9	5	5	1	2				1							64
5–9	3	1	3	7	11	16	7	4	1		2	1										56
0–4	38	6	11	16	9	8	4	1	1	1												95
Total	63	18	46	117	260	373	506	536	877	212	197	109	121	59	48	33	40	10	1		1	3,627

TABLE 289.—*Variables: Beta score × schooling. Groups I, II, III: White draft (foreign born).*

For men who took beta only, or alpha and beta.

Beta score.	No schooling.	Grades.								High school.				College.									Total.
		1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5	6	7	8	9	
115–118									1														1
110–114																							0
105–109	1								2														3
100–104					3	2	1		3														9
95– 99	1				11			3	3	1	1	1											21
90– 94	1			6	4	8	8	2	8	1	2												40
85– 89	1	1		3	13	7	10	11	16														62
80– 84	2	2	2	8	18	18	17	19	23	1	2	1	1	1	1		1						117
75– 79	3	3	11	4	22	15	25	35	23	5	4	3											146
70– 74	6	3	7	23	25	33	32	32	29	6	6	2	2	1									207
65– 69	8	6	15	27	43	39	50	47	49	5	1	1			1								292
60– 64	15	6	25	43	58	37	57	50	40	5	7	4	5	1									353
55– 59	23	9	20	60	69	43	71	56	40	6	3	1	1	2	1								405
50– 54	30	15	34	63	60	63	58	43	41	4	4	2	2	1			1					1	422
45– 49	34	27	29	77	72	52	55	53	33	1	2	1	1		1								438
40– 44	55	22	47	82	71	51	50	41	39	3	3	1	2		1								468
35– 39	74	30	55	84	74	50	34	33	32	4	3	1											474
30– 34	94	31	53	91	62	38	41	19	28	1	1	1	2	1									463
25– 29	105	45	54	75	48	31	29	20	19	1	2		1		1								431
20– 24	112	34	45	44	43	28	18	11	18		3												356
15– 19	75	38	29	31	30	11	9	5	7			1											236
10– 14	63	14	13	21	6	8	4	2	2	1	1												135
5– 9	51	14	12	20	4	4	5	4															114
0– 4	48	7	5	8	4	3		1	1														77
Total	802	307	449	770	740	541	574	488	457	45	45	20	17	7	6		2					1	5,271

TABLE 290.—*Variables: Score on performance scale examination × schooling. Groups I, II, III: White draft (foreign born).*

For men who took performance scale following alpha, or following beta, or following alpha and beta, or who took performance scale examination only.

Score on performance scale.	No schooling.	Grades.								Total.
		1	2	3	4	5	6	7	8	
220–229						1		1		2
210–219										0
200–209	3									3
190–199			1		1					2
180–189	2		1			1		1		5
170–179	3	2					1	1	1	8
160–169	1		1	4	1			2		9
150–159	6	2	2	2		2				14
140–149	5	4	1	2	1	2		1	1	17
130–139	7	1		2		1				11
120–129	7	1	1	4		2				18
110–119	12	3		1	2	1		1		20
100–109	20	4	7	2	1	1	1			36
90– 99	13	4	5	4	3	3				32
80– 89	25	6	2	3			1	2	3	42
70– 79	24	6	5	6	5	2	1	2		51
60– 69	49	5	4	5	2	4	2	1		72
50– 59	35	3	11	4		1			1	55
40– 49	19	3	3	4	1		1		1	32
30– 39	20	4	1		1	1	2			29
20– 29	10	3	2		2					17
10– 19	10		1	1						12
0– 9	2									2
Total	273	51	51	44	20	22	9	12	7	489

TABLE 291.—*Variables: Mental age on Stanford-Binet examination × schooling. Groups I, II, III: White draft (foreign born).*

For men who took Stanford-Binet following alpha, or following beta, or following alpha and beta, or who took Stanford-Binet only.

Score on Stanford-Binet scale.	No schooling.	Grades.								High school.				Total.
		1	2	3	4	5	6	7	8	1	2	3	4	
13.0–13.4												1		1
12.5–12.9														0
12.0–12.4									1					1
11.5–11.9	3													3
11.0–11.4	3													3
10.5–10.9	3		1	1		2			2					9
10.0–10.4	5		1	1				1						8
9.5– 9.9	4	3		1	1	2		1						12
9.0– 9.4	12	1		2	4	3		1						31
8.5– 8.9	16	6	1	1			1	1						26
8.0– 8.4	5	2	1	1	1		1	2						13
7.5– 7.9	1		1									1		2
7.0– 7.4														0
6.5– 6.9														0
6.0– 6.4														0
5.5– 5.9	1													1
Total	53	12	12	7	6	7	3	6	3			1		110

TABLE 292.—*Variables: Alpha × schooling. Groups I, II, III: White draft (foreign born).*

For men who took alpha only, or alpha and beta only.

Alpha score.	No schooling.	Grades.								High school.				College.								Total.
		1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5	6	7	8	
205–212												1										1
200–204																						0
195–199																	1					1
190–194																						0
185–189											1											1
180–184									1		1				1							3
175–179									1	1												2
170–174					1						1	1	2	2	1						1	9
165–169										2					2		3					7
160–164									1		1		2				2					6
155–159					2				1		2		2	1		1	1					10
150–154								1	1		2	2	1									7
145–149								2		3		1	4			2	3					15
140–144						1			7		5	4	1	1	1		3					23
135–139							2	1	6	3	1	2	2	2	1	2	1		1			24
130–134							1	2	8	1	5	5			2	1						25
125–129					1		1	4	7	2	3	2	3	1	1		1	1				27
120–124						1	2	1	9	3	4	3	6	1	2	2	2	1				37
115–119							3	6	17	5	4	3	4	3	1	1	4	1				52
110–114					1	1	1	4	11	7	7	1	8	3	2	1						47
105–109				4			5	5	25	5	6	6	2	4	2	2	2					68
100–104						2	2	9	19	11	7	9	6	1	2	2	4	1				75
95– 99					2	2	7	14	27	5	9	2	7	6	3							84
90– 94					2	4	8	12	38	8	10	2	5	5	2	2		1				99
85– 89			1		1	5	13	31	39	8	9	3	5	2	3	1	2					123
80– 84	1		1		2	8	10	27	45	15	10	5	6	4	2	2	3	1				142
75– 79	1				8	6	13	25	46	11	12	4	6	1	3		2					138
70– 74	1				4	10	17	21	41	17	11	6	4	5	3	2	2	1				145
65– 69	1		1		7	11	24	23	59	13	10	7	1	2	1	2						162
60– 64	1		1		6	14	32	43	49	19	10	6	5	1	2	2						191
55– 59	2			2	4	18	37	36	48	12	10	4	8	1	3							185
50– 54	2		4	5	9	22	30	50	60	7	14		7	4	3	1	2					220
45– 49	3	2	3	3	11	32	34	29	70	9	12	5	8	2	2	1	1					227
40– 44	1	1	4	7	23	38	48	48	59	12	6	5	8	1	1			1				263
35– 39	2	2	3	6	31	40	39	39	49	8	7	8	1	1		2						238
30– 34	1	2	6	9	31	31	53	35	45	10	8	6	2	2	2	1	1	1				246
25– 29	2		4	19	46	35	50	40	37	7	4	4	4	3		1						266
20– 24	1	2	6	28	38	57	57	22	41	8	3	3						1				270
15– 19	3	3	7	18	44	44	36	29	22	6	2	2	3	1		2	1					223
10– 14	6	3	9	21	33	40	29	14	14	4	4	2	2		2						1	187
5– 9	7	2	7	22	26	41	19	10	9	1	6	4		1								155
0– 4	42	10	17	28	22	15	10	6	6	1		1										158
Total	80	27	74	175	355	478	583	589	928	224	207	119	125	61	50	33	41	10	1		2	4,162

TABLE 293.—*Variables: Beta × schooling. Groups I, II, III: White draft (foreign born).*

For men who took beta only, or alpha and beta only, or beta and an individual examination, or alpha and beta and an individual examination.

Beta score.	No schooling.	Grades.								High school.				College.									Total.
		1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5	6	7	8	9	
105–109	1								2														3
100–104					3	2	1		3														9
95– 99	1				11			3	3	1	1	1											21
90– 94	1			6	4	8	8	2	8	1	2												40
85– 89	1	1		3	13	7	10	11	16														62
80– 84	2	2	2	8	18	18	17	19	23	1	2	1	1	1	1		1						117
75– 79	3	3	4	4	22	15	25	35	23	5	4	3											146
70– 74	6	3	7	23	25	33	32	32	29	6	6	2	2	1									207
65– 69	8	6	15	27	43	39	50	47	49	8	1	1			1								292
60– 64	15	6	25	43	58	37	57	50	40	5	7	4	5										353
55– 59	23	9	20	60	69	43	71	56	40	6	3	1	1	2	1								405
50– 54	30	15	34	63	60	63	58	43	41	4	4	2	2	1			1					1	422
45– 49	34	27	29	77	72	52	55	53	33	1	2	1	1		1								438
40– 44	55	22	47	82	71	52	50	41	39	3	3	1	2		1								469
35– 39	74	30	55	84	75	50	34	33	32	4	3	1											475
30– 34	94	31	53	92	64	38	42	20	28	2	1	1	2	1									469
25– 29	110	45	54	76	49	34	35	22	20	1	2		1		1								450
20– 24	124	39	46	40	46	31	21	14	19		3												392
15– 19	130	55	44	43	33	14	11	6	7			1											344
10– 14	161	28	36	29	11	17	5	6	5	1	1												300
5– 9	140	22	20	27	10	8	5	5	1														238
0– 4	95	13	8	16	7	4	3	2	1														149
Total	1,108	357	499	812	764	565	590	501	463	46	45	20	17	7	6	0	2	0	0	0	0	1	5,803

TABLE 294.—*Variables: Alpha score × schooling. Group V: Colored draft, North.*

For men who took alpha only.

Alpha score.	No schooling.	Grades.								High school.				College.							Total.
		1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5	6	7	
185–189								1													1
180–184																1					1
175–179																1	1				2
170–174										1			1				1				3
165–169											1										1
160–164											2	1	1				2				6
155–159											1		1				1				3
150–154																1					1
145–149										1							1				2
140–144						1				1		2	3	1	1					1	11
135–139										1			1	1		1					5
130–134										2		2	2	2	1						9
125–129						1			2	3	1	1	1	1			2				13
120–124									1	4		1	1	3	2		1				13
115–119		1								4	3	3	2	6	2	1					22
110–114								1	2	4	3	4	4	3	1	2	2				26
105–109						1	1		2	6	3	5	3	3		3	1	4			32
100–104					1			2	2	6	8	6	1	2	1	3		1			33
95– 99			1			1	1	2	11	19	5	5	6	4	1	1	1	1			59
90– 94			1					2	2	6	8	6	1	2	1	3		1			33
85– 89					1	1	2	4	6	18	12	7	1	8		2	1	3	2		68
80– 84							1	3	8	15	7	9	5	9	1		1	2			61
75– 79					2	1	6	6	10	22	8	8	7	4	2	3	1	1			81
70– 74					2	2	4	9	8	27	6	6	6	5	2			2			79
65– 69						4	6	14	13	26	8	7	4	7		4		1			94
60– 64						6	3	14	11	25	10	9	10	10	1	2	1	1			103
55– 59				1	3	8	19	18	22	40	8	5		5	1		1	1			132
50– 54						7	19	22	23	51	8	10	2	6	1	2	3				154
45– 49		1		1	2	11	24	22	23	36	6	10	5	1			1	1			144
40– 44		1			3	16	24	33	28	55	7	4	3	4			2				180
35– 39			1		4	23	33	26	34	49	9	3	2	1	1						186
30– 34				3	7	23	43	32	37	40	5	7	2	3			3				205
25– 29		1	1	2	6	21	47	34	34	22	6	4	1	1			1				181
20– 24		1	1	4	11	28	47	35	25	29	2	3		1	2						189
15– 19				5	25	28	55	38	36	24	5	2		4							222
10– 14		1		3	6	10	14	8	7	2			1				1				53
5– 9			1	3	12	11	22	4	6	1											64
0– 4		2	2	5	11	15	4	3	2	2		1									47
Total		8	6	29	96	219	375	332	354	543	145	130	72	100	25	30	24	28	2	0	1	2,519

TABLE 295.—*Variables: Beta score × schooling. Group V: Colored draft, North.*

For men who took beta only, or alpha and beta only.

Beta score.	No schooling.	Grades.								High school.				College.				Total.
		1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	
100–104											1							1
95– 99																		0
90– 94						1			1		1				1			4
85– 89	1									1								2
80– 84					1	2			1									4
75– 79				1	5	3	5											14
70– 74					2	2	1	2	3		1				1			12
65– 69	3			3	5	8	9	4	2	1		1						36
60– 64	5	1	8	4	13	6	7	5			1							57
55– 59	6	3	2	15	19	16	10	2	2									75
50– 54	4	3	4	12	32	27	9	8	2				1		1			103
45– 49	16	6	9	22	32	22	10	9	5	2		2					1	136
40– 44	15	8	17	23	32	27	11	6	3			2	1					146
35– 39	19	10	26	30	43	22	13	10	4	3	1							181
30– 34	26	18	22	36	44	18	10	9	3	3			1					190
25– 29	27	16	30	40	36	21	6	4	2	2	1		1					186
20– 24	32	24	18	37	43	24	9	3	9	1		3						203
15– 19	33	16	17	26	28	4	2	4	5			2						137
10– 14	20	15	10	15	9	4	1		1									75
5– 9	19	10	11	8	6		1	2	1									58
0– 4	4	5	5	2	1													17
Total	230	135	179	281	351	207	104	68	44	13	7	10	4	0	3	0	1	1,637

TABLE 296.—*Variables: Mental age on Stanford-Binet examination × schooling. Group V: Colored draft, North.*

For men who took Stanford-Binet following alpha, or following beta, or following alpha and beta, or who took Stanford-Binet only.

Score on Stanford-Binet scale.	No schooling.	Grades.								Total.
		1	2	3	4	5	6	7	8	
13.0–13.4	1									1
12.5–12.9							1			1
12.0–12.4										0
11.5–11.9				1						1
11.0–11.4			1					1		2
10.5–10.9		1								1
10.0–10.4	1		1	1		1				4
9.5– 9.9	2	1	1	2	1	2			1	10
9.0– 9.4	14	7	7	7	1	2	1	1		40
8.5– 8.9	5		1		3	2				11
8.0– 8.4	6	3			1	1				11
7.5– 7.9	3	1								4
7.0– 7.4	4		1	1						6
6.5– 6.9	4									4
6.0– 6.4	1									1
5.5– 5.9		1								1
Total	41	14	12	12	6	8	2	2	1	98

TABLE 297.—*Variables: Alpha × schooling. Group V: Colored draft, North.*

For men who took alpha only, or alpha and beta only.

Alpha score.	No schooling.	Grades.								High school.				College.							Total.
		1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5	6	7	
185–189								1													1
180–184																1					1
175–179																1	1				2
170–174										1			1				1				3
165–169											1										1
160–164											2	1	1				2				6
155–159											1		1				1				3
150–154																1					1
145–149										1							1				2
140–144					1				1	1		2	3	1	1					1	11
135–139									1	1			1	1		1					5
130–134										2		2	2	2	1						9
125–129					1			2	3	1	1	1	1	1			2				13
120–124								1	4		1		1	3	2		1				13
115–119	1								4	3	3	2	6	2	1						22
110–114						1	1	2	4	3	4	4	3	1	2	2					27
105–109					1	1		2	6	3	5	3	3		3	1	4				32
100–104				1			2	2	6	8	6	1	2	1	3		1				33
95– 99			1		1	1	2	11	19	5	5	6	4	1	1	1	1				59
90– 94			1				2	2	6	8	6	1	2	1	3		1				33
85– 89				1	1	2	4	6	18	12	7	1	8		2	1	3	2			68
80– 84							3	8	15	7	9	5	9	1		1	2				61
75– 79				2	1	6	6	10	22	8	8	7	4	2	3	1	1				81
70– 74				2	2	4	9	8	27	6	6	6	5	2			3				80
65– 69					4	6	14	13	26	8	7	4	7		4		1				94
60– 64					6	3	14	11	25	10	9	10	10	1	2	1	1				103
55– 59			1	3	8	19	18	22	40	8	5		5	1		1	1				132
50– 54					7	19	22	23	51	8	10	2	6	1	2	3					154
45– 49	1		1	2	11	24	22	23	36	6	10	5	1			1	1				144
40– 44	1			3	16	24	33	28	55	7	4	3	4			2					180
35– 39		1		4	23	33	26	34	49	9	3	2	1	1							186
30– 34			3	7	23	43	33	37	40	5	7	2	3			3					206
25– 29	1	1	2	6	21	47	34	34	22	6	4	1	1			1					181
20– 24	1	1	4	11	28	47	35	25	29	2	3		1	2							189
15– 19			5	26	28	56	38	36	24	5	2		4								224
10– 14	1		9	22	53	58	32	24	9	2		1	4			1					216
5– 9	1	3	5	26	42	54	17	10	7	3											168
0– 4	3	2	7	22	34	18	7	4	6	2	1										106
Total	10	8	39	138	312	467	374	379	555	151	130	72	104	25	30	24	29	2	0	1	2,850

TABLE 298.—*Variables: Beta × schooling. Group V: Colored draft, North.*

For men who took beta only, or alpha and beta only, or beta and an individual examination, or alpha and beta and an individual examination.

Beta score.	No schooling.	Grades.								High school.				College.				Total.
		1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	
100–104											1							1
95– 99																		0
90– 94						1			1		1				1			4
85– 89	1									1								2
80– 84					1	2			1									4
75– 79				1	5	3	5											14
70– 74					2	2	1	2	3		1				1			12
65– 69	3			3	5	8	9	4	2	1		1						36
60– 64	5	1	8	11	13	6	7	5			1							57
55– 59	6	3	2	15	19	16	10	2	2									75
50– 54	4	3	4	12	32	27	9	8	2					1	1			103
45– 49	16	6	9	22	32	22	10	9	5	2		2						136
40– 44	15	8	17	23	32	27	11	6	3		1	2	1					146
35– 39	19	10	26	30	43	22	13	11	4	3	1							182
30– 34	26	18	22	36	44	18	10	9	3	3				1				190
25– 29	27	16	30	40	36	21	6	4	2	2	1			1				186
20– 24	33	26	19	40	43	24	10	3	9	1		3						211
15– 19	46	18	21	29	33	7	2	4	5			2						167
10– 14	36	21	15	18	12	6	1	1	2									112
5– 9	31	13	12	11	6	1	2	2	1									79
0– 4	5	6	6	2	1													20
Total	273	149	191	293	359	213	106	70	45	13	7	10	4	0	3	0	1	1,737

TABLE 299.—*Variables: Alpha × schooling. Part of Group IV: Colored draft, South (Alabama, Georgia, Louisiana, and Mississippi).*

For men who took alpha only.

Alpha score.	No schooling.	Grades.								High school.				College.				Total.
		1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	
105-109									1			1	1					3
100-104					1				3			1			2			7
95- 99																		0
90- 94								1	1		1		1		1			5
85- 89							1		1	1	1		1	1	2		1	9
80- 84						1		1	1		2	2					1	8
75- 79					1	1	1	1	1	1		1					1	8
70- 74							1		2	1	3		1			1		10
65- 69							1	1	4	2	2	1	3	2	1		3	20
60- 64						1		3	4	1	1				1		1	12
55- 59					1	3	3	2	3	2	1	1	3	1	1	1		22
50- 54						1	3	7	6		4	1	1	1	2			26
45- 49			1	2		4	5	6	6		3		3	1	1		1	33
40- 44				1	3	10	8	8	11	2	4	1						48
35- 39				2	9	7	11	10	15	1	3			2			1	61
30- 34				2	9	16	19	12	10		2	4		1				75
25- 29				2	11	20	17	16	9	5	4		1	1				86
20- 24	14		1	5	22	32	17	12	10	2				2				117
15- 19		1	2	22	24	37	23	18	17	1	1		1					147
10- 14		1	3	28	42	39	26	16	8	1	1		3					168
5- 9	1	2	14	41	70	69	39	17	16	2		1	1					273
0- 4	5	11	38	74	102	63	26	15	7			1	1					343
Total	20	15	59	179	295	304	201	146	136	22	33	15	21	12	12	2	9	1,481

TABLE 300.—*Variables: Alpha × schooling. Part of Group IV: Colored draft, South (Alabama, Georgia, Louisiana, and Mississippi).*

For men who took alpha only, or alpha and beta only.

Alpha score.	No schooling.	Grades.								High school.				College.				Total.
		1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	
105-109									1			1	1					3
100-104					1				3			1			2			7
95- 99																		0
90- 94								1	1		1		1		1			5
85- 89							1		1	1	1		1	1	2		1	9
80- 84						1		1	1		2	2					1	8
75- 79					1	1	1	1	1	1		1					1	8
70- 74							1		2	1	3		1		1	1		10
65- 69							1	1	4	2	2	1	3	2	1		3	20
60- 64						1		3	4	1	1				1		1	12
55- 59						1	3	2	3	2	1	1	3	1	1	1		22
50- 54						1	3	7	6		4	1	1	1	2			26
45- 49			1	2		5	5	6	6		4		3	1	1		1	35
40- 44				1	3	11	8	8	11	2	4	1						49
35- 39				2	9	7	12	10	15	1	4			2			1	63
30- 34				3	10	16	19	13	11		2	4		1				79
25- 29				3	12	21	18	17	9	5	4		1	1				91
20- 24	14		1	5	22	36	17	13	12	2				2				124
15- 19		1	2	23	29	40	26	20	19	1	1		1					163
10- 14		2	6	35	59	61	31	20	9	1	2		3					229
5- 9	1	2	21	53	97	85	46	19	17	2		2	1					346
0- 4	6	18	46	88	112	77	26	16	8	1		1	1					400
Total	21	23	77	215	356	366	218	158	144	23	36	16	21	12	12	2	9	1,709

TABLE 301.—*Variables: Beta × schooling. Group IV: Colored draft, South.*

For men who took beta only, or alpha and beta only.

Beta score.	No schooling.	Grades.								High school.				College.				Total.
		1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	
100-104												1	1					2
95- 99									1									1
90- 94									1				1					2
85- 89							1	1		2		1						5
80- 84			1			1		1										3
75- 79					3	1	2	3	1		1		1				1	12
70- 74	1			2	1		4	2	1	2	1		1					15
65- 69			1	4	4	5	7	1	5		1	1						29
60- 64	1	2	3	3	8	6	6	3	3	1		1						37
55- 59		1	3	4	12	16	6	9	3	2	1				1			58
50- 54	3	4	5	9	16	15	11	4	5					1				73
45- 49	4	14	13	21	31	18	8	4	6									119
40- 44	5	7	16	25	43	13	6	12	1	1		1	1					131
35- 39	24	17	25	39	35	35	21	8	5		2							211
30- 34	22	26	36	39	52	36	15	9	4	1	2	1						243
25- 29	49	55	55	81	44	33	12	8	3	1	1	1	1					344
20- 24	94	75	66	80	54	22	9	8	4									412
15- 19	139	101	85	87	47	29	10	2	8	1	1							510
10- 14	214	103	93	64	45	14	4	3	4			1						545
5- 9	218	85	57	32	23	9	5	4	1									434
0- 4	151	46	20	19	13	1	1						1					252
Total	925	536	479	509	431	233	128	82	56	11	10	8	7	1	1	0	1	3,438

From these 22 fundamental tables are derived all others in this chapter, except such as are designated as coming from special camp reports.

Our first interest is to know what were the actual conditions found in regard to the schooling of the Army. How many years has an officer been to school? How many years has a recruit been to school? What per cent graduate from eighth grade; enter high school; enter college; graduate? What can we readily infer about elimination from school in this country? Study of tables 302 to 325 and figures 24 to 49 will answer many of these questions concerning officers, native born and foreign white recruits, and northern and southern negro recruits.

TABLE 302.—*Per cent distribution of schooling. Officers and recruits.*

(See figures 24 to 27.)

Years schooling.	Officers.	White draft, native born.	White draft, foreign born.	Negro draft, North.	Negro draft, South.	Medical officers.	Infantry officers.	Artillery officers.	Engineer officers.	Quartermaster officers.	Dental officers.	Veterinary officers.
College:												
25	0.0					0.0						
24	0.0					0.1	0.0					
23	0.0					0.1	0.0					
22	0.1					0.5	0.0					
21	0.3					1.1	0.0	0.1				
20	2.1	0.0	0.0			9.5	0.1	0.2	0.2			0.4
19	2.7	0.0				7.3	1.5	1.8	0.9	1.3	1.8	0.9
18	4.6	0.0	0.0			12.5	2.2	3.2	2.2	1.3	2.7	5.3
17	4.8	0.1	0.1	0.0		9.2	2.9	5.2	8.2	1.3	6.2	5.3
16	31.4	1.1	0.4	0.7	0.2	48.0	24.1	37.4	53.5	16.7	33.9	18.8
15	12.9	0.9	0.3	0.6	0.0	5.3	12.7	14.4	11.8	10.7	47.8	61.0
14	10.0	1.5	0.6	0.8	0.3	2.2	13.2	12.3	7.4	13.4	2.4	
13	5.7	1.8	0.7	0.6	0.3	0.5	7.9	6.3	4.0	8.5	0.6	
High school:												
12	10.0	4.1	1.5	2.4	0.6	1.6	13.9	10.0	5.4	17.1	2.7	
11	3.7	2.7	1.4	1.9	0.5	0.3	5.5	2.3	1.8	7.0	0.9	
10	3.9	4.8	2.5	3.2	0.9	0.8	5.3	2.8	2.0	6.4	0.6	4.8
9	2.6	6.3	2.7	3.7	0.7	0.0	3.7	1.4	0.9	4.0	0.3	1.3
Grades:												
8	3.6	25.4	14.2	13.8	3.8	0.5	(5.0)	1.3	1.1	9.0		2.2
7	(0.5)	14.4	11.0	10.0	4.7	(0.2)	(0.6)	(0.3)	(0.7)	(1.1)		
6	(0.4)	10.4	11.5	10.1	6.7	(0.2)	(0.6)	(0.3)	(0.2)	(0.7)		
5	(0.3)	9.7	9.9	13.8	11.3	(0.1)	(0.3)	(0.2)		(1.0)		
4	(0.2)	7.3	10.7	13.5	14.6	(0.0)	(0.3)	(0.2)				
3	(0.2)	3.9	9.9	9.1	13.9		(0.2)	(0.3)		(0.2)	(0.3)	
2	(0.1)	2.3	5.9	5.2	11.0		(0.1)					
1	(0.0)	1.5	4.1	3.6	11.2		(0.0)					
0	(0.0)	1.9	12.5	6.6	19.4		(0.0)			(0.2)		
Number of cases	12,396	60,250	9,498	4,254	4,938	2,559	6,154	1,255	448	598		

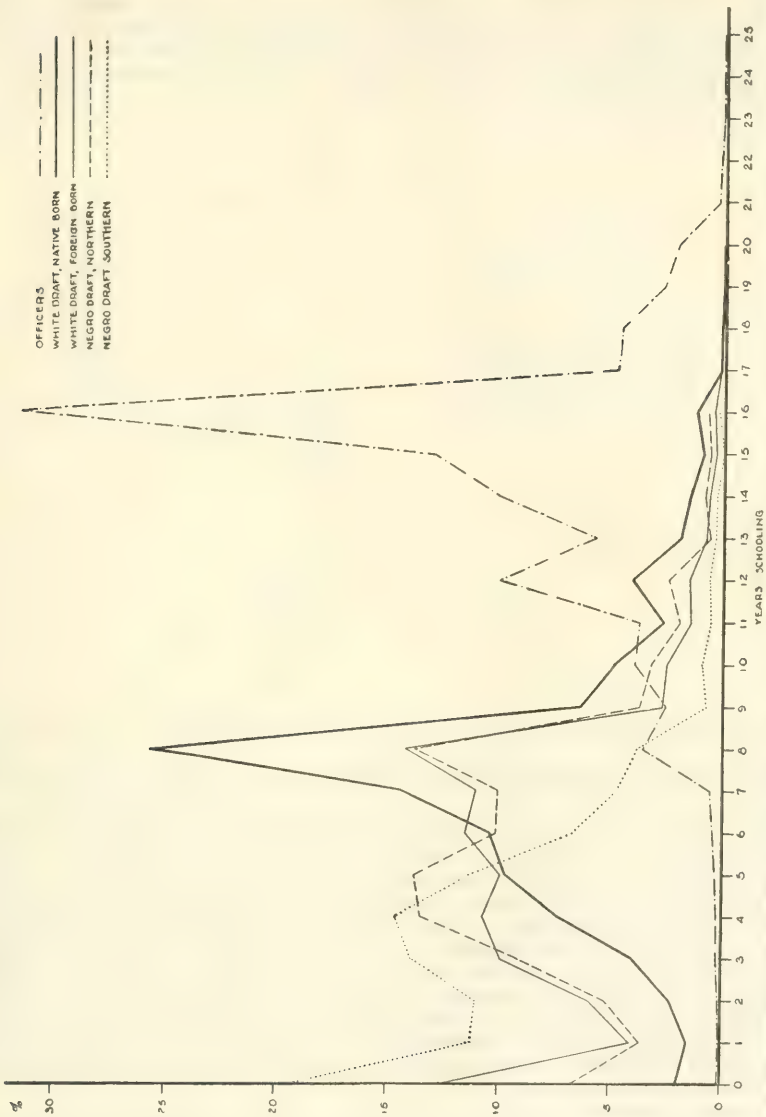


FIG. 24. Distribution of schooling. For the latter groups, distinct modes appear at the years of graduation—eighth grade, fourth year high school and fourth year college. These represent stopping places, as well as school attendance laws, distort distributions which might otherwise approximate the normal. In the negro group, however, the central tendency for the group falls so much lower than the eighth grade that a lower mode appears at the fourth or fifth grade. The per cent reporting no schooling in the negro groups is very high. (See tables 302 and 303.)

Almost one-third of all officers are college graduates who have gone no farther; this is the schooling most frequently reported among the officer group. Practically all officers must have graduated from eighth grade; one fourth have not gone beyond high school; more than another fourth have begun but not completed a college course. The remainder, about one-seventh, have done one, two, or more years of graduate work. This distribution, which is

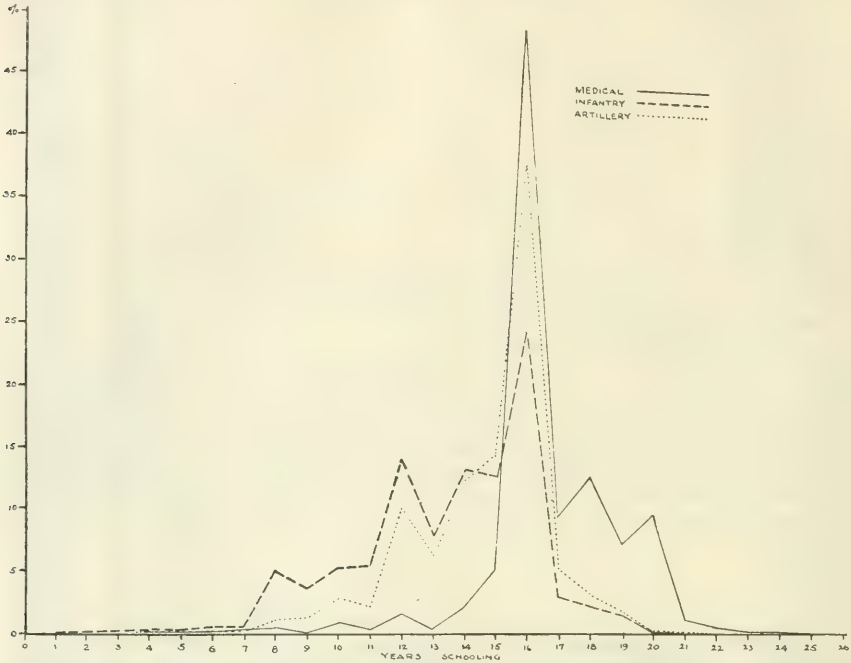


FIG. 25. Distribution of schooling. The differences between the amounts of schooling reported by officers in different branches of the service is quite appreciable. Medical officers have remained in school longer than officers in the Infantry or the Artillery. (See tables 302 and 303.)

negligible below eight years with a steep mode at sixteen years (see table 302, figure 24), is in striking contrast to that representing the schooling of recruits. Of native-born white recruits, one-fourth are eighth-grade graduates who have had no further schooling: this is the schooling most frequently reported. More than half have gone no farther than the seventh grade; almost one-fourth have had more or less high-school training, while only 5.4 per cent—one-twentieth—have entered college and only 1.25 per cent have been graduated. The white draft of foreign birth is less schooled; more than half of this group have not gone beyond the fifth grade, while one-eighth, or 12.5 per cent, report no schooling. Negro recruits, though brought up in this country where elementary education is supposedly not only free but compulsory on all, report no schooling in astonishingly large proportion (19 per cent in the southern, 7 per cent in the northern States); more than half the negroes from southern States have not gone beyond the third grade, and only 7 per cent finish the eighth. In northern States, half do not go beyond the fifth grade, and about one-fourth finish the eighth. The median schooling for each group is as follows:

Table 302 and figures 25, 26, and 27 present further analysis of the educational achievements of officers. "Officers" make a fairly homogeneous group, yet distinct differences appear when each arm of the service is separately plotted. It is not surprising, in view of the requirements of the medical profession, that the Medical Corps has in general longer education than any other; this is, however, surprising when it is remembered that all branches outside the

Medical Department make better records on the intelligence examinations than does the Medical Corps. (See Part II, chapter 14.) The contrast with the Quartermaster Corps, which makes a very similar intelligence record but is much less schooled, is especially interesting in considering to what extent examination alpha is dependent on schooling. The Dental and Veterinary Corps also stand high relative to other officers as to schooling, and low as to intelligence rating. That the most frequent schooling among dentists, and especially among veterinarians, is three years college is doubtless explained by the fact that many dental colleges and most veterinary colleges normally offer a three-year course. (See also table 303.)

TABLE 303.—*Median years schooling.*

Group.	Median schooling [1]
Officers	14.7 (almost through third year college).
White draft, native born	6.9 (almost through grade 7).
White draft, foreign	4.7 (almost through grade 5).
Negro draft, northern	4.9 (almost through grade 5).
Negro draft, southern	2.6 (halfway through grade 3).
Officers:	
Medical Corps	15.8 (almost through fourth year college).
Infantry	13.5 (halfway through second year college).
Artillery	14.8 (almost through third year college.
Engineer	15.3 (part way through fourth year college).
Quartermaster Corps	12.4 (part way through first year college).
Dental	14.9 (almost through third year college).
Veterinary	14.7 (almost through third year college).

[1] The numbers here indicate the year completed, i. e., 6 means sixth grade just completed; 6.5 means halfway through the seventh grade; 6.9 means almost ready to enter the eighth grade.

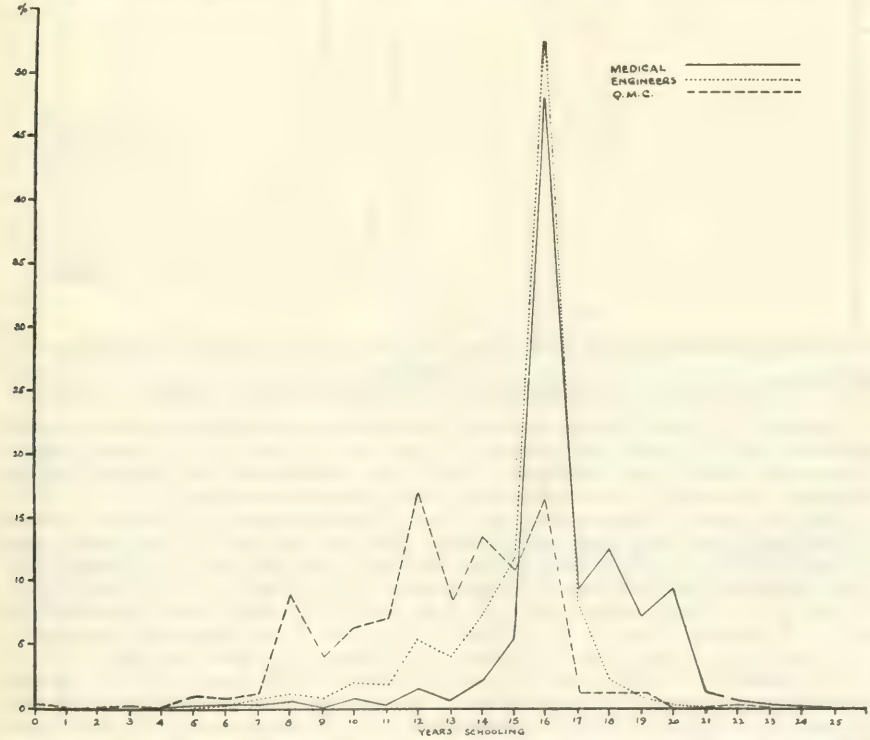


FIG. 26. Distribution of schooling. Engineers stand second only to medical officers in length of schooling reported. The officers of the Quartermaster Corps, though they are the least schooled of the groups here compared, make as high an intelligence rating on examination alpha as do the officers of the Medical Corps. (See tables 302 and 303.)

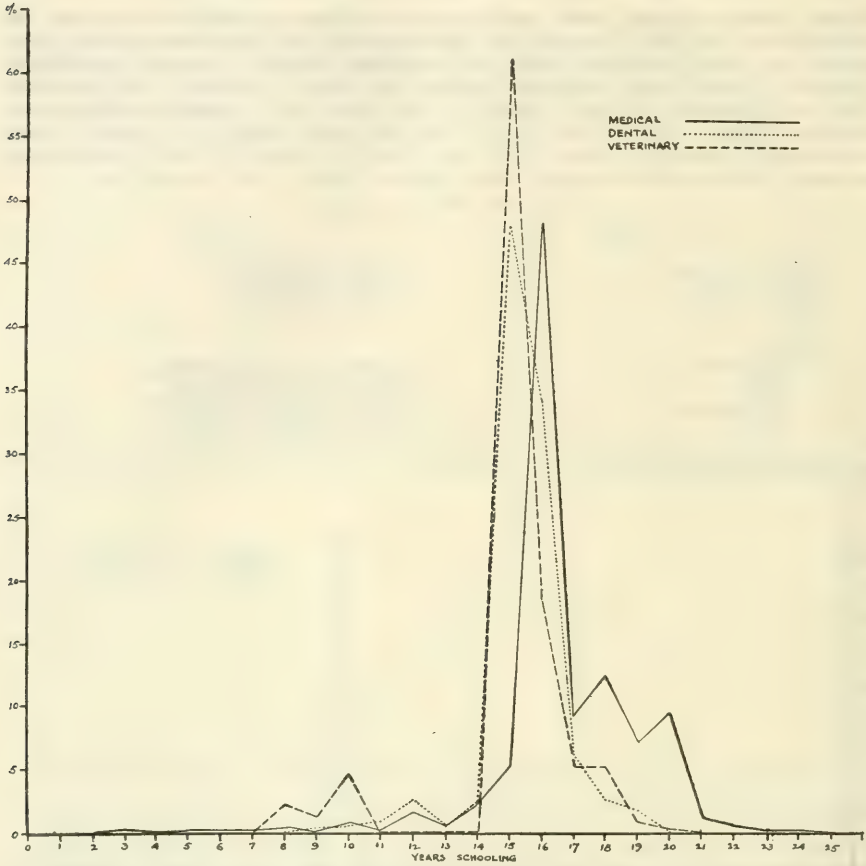


FIG. 27. Distribution of schooling. Dental and veterinary officers are less schooled than medical officers. The mode falls at third year college because a three-year course is what is usually offered in their professional schools. (See tables 302 and 303.)

Later study of medical records has shown that the scattering cases where officers reported, for instance, four, or seven, years schooling, etc., were usually actually "four years college," "seven years college," etc. This lower "tail" of the distribution may therefore best be disregarded as an artifact due to the method by which the data were collected.[1]

The light thrown by these tables on the extent of elimination in our public-school systems will doubtless attract attention in school circles. The facts reported by white recruits may be stated in this form: Of 100 white recruits who entered the first grade in this country, 95 remained in school till grade two, 92 till grade three, 87 till grade four, 79 till grade five, 70 till grade six, 59 till grade seven, and 45 till grade eight; 21 of them entered high school, 16 kept on till the second year, 11 till the third, and 9 of the 100 graduated from high school; 5 of these entered college, and 1 graduated from college. (See table 304, figure 28.) It is to be remembered that this includes the foreign-born but not the negro draft, and does not include officers. Figures for the native-born white draft are given in table 304, which also gives previous estimates of elimination from school. It is interesting to see how closely some of these have approached the figures actually reported by the draft.

[1] Intellectual and Educational status of the Medical Profession as Represented in the United States Army. Bull. National Research Council, No. 8, 1921.

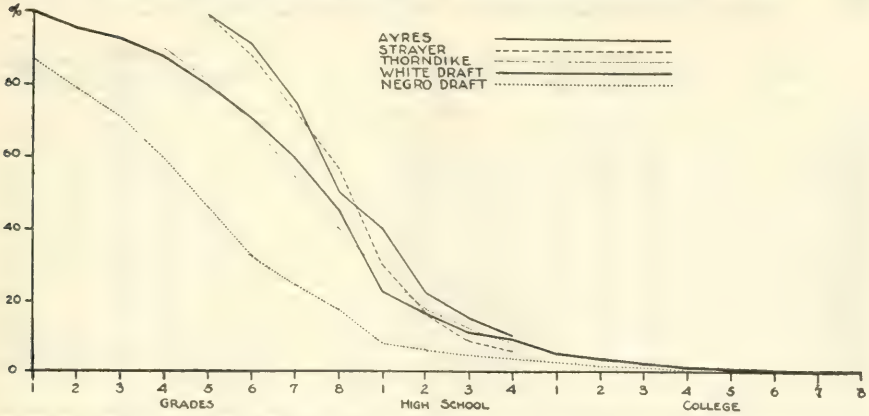


FIG. 28. Elimination from school. Of each 100 white recruits ready to enter first grade 45 continued long enough to graduate from eighth grade, 9 from high school, and 1 from college.

TABLE 304.—*Elimination from grades, high school and college.*

Studies of elimination from school.	Grades.								High school.				College.			
	1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4
Ayers' estimate [1]	100	100	100	100	100	92	75	50	40	22	15	10	.....	.....	.....	.....
Ayres (Cleveland) [2]	100	100	100	100	99	93	80	63	41	29	21	19	.....	.....	.....	.....
Strayer's estimate [3]	100	100	100	100	100	89	73	57	30	16	9	6	.....	.....	.....	.....
Thorndike's estimate [4]	.....	.....	.....	90	81	68	54	40	27	17	12	8	.....	.....	.....	.....
Groups I, II, and III, white draft	97	95	92	87	79	70	59	45	21	16	11	9	5	3	2	1
Groups I, II, and III, native born, white draft	98	97	94	90.5	83	73.5	63	49	23	17	12	9.5	5	4	2	1
Group IV, negro draft	86.5	79	70.5	59	45	32	24	17	8	6	4	3	2	1	1	0.4

[1] Ayres, L. P., Laggards in Our Schools, 1909, pp. 66–72.
[2] Ayres, L. P., Cleveland Education Survey, 1917: Vol. 3, Child Accounting in the Public Schools, p. 33; and vol. 26, Cleveland School Survey (Summary Volume), p. 88.
[3] Strayer, G. D., Age and Grade Census of Schools and Colleges, U. S. Bureau Educ. Bull. 1911, No. 5, especially pp. 6, 7.
[4] Thorndike, E. L., The Elimination of Pupils from School, U. S. Bureau Educ. Bull. 1907, No. 4, especially pp. 11ff, 27, 37ff.

SECTION 2.—*The intelligence of the Army.*

Before going into the relation of education to the Army intelligence examinations it will be well to present briefly the performance on these examinations of each entire group, regardless of schooling. The differences between these groups, it will be seen, roughly correspond to the schooling differences previously presented, and to such an extent as to force recognition of a common factor. Tables 305 and 306 and figures 29 and 30 show, respectively, the distributions of alpha and of beta scores for officers (no beta), native born and foreign white draft, and northern and southern negro groups.[1]

[1] To show completely the examination results it would be necessary to present also the individual examination records; the proportion individually examined was, however, so small as not to change materially the present comparison. Such cases make up 1.7 per cent of the native born and 6 per cent of the foreign born white draft, 2.3 per cent of the northern negro, and 0.4 per cent of the southern negro draft; the fundamental tables earlier in the chapter give distributions of the intelligence ratings of these individually examined groups. Some men in these groups were examined also by alpha, and many by beta, and these appear already in the alpha and the beta distributions; all of them appear in the schooling distributions in table 302 and figure 24.

TABLE 305.—*Per cent distribution of total alpha scores made by officers and recruits of various groups.*

Alpha score.	Officers.	White draft, native born.	White draft, foreign born.	Colored draft, North.	Colored draft, South.	Alpha score.	Officers.	White draft, native born.	White draft, foreign born.	Colored draft, North.	Colored draft, South.
205–212	0.1	0.0	0.0	.....	.....	90–94	2.1	3.2	2.4	1.2	0.3
200–204	0.2	0.0	.....	.....	.....	85–89	1.8	3.4	3.0	2.4	0.5
195–199	0.8	0.0	0.0	.....	.....	80–84	1.7	3.6	3.4	2.1	0.5
190–194	1.2	0.0	.....	.....	.....	75–79	1.1	3.9	3.3	2.8	0.5
185–189	2.0	0.1	0.0	0.04	.....	70–74	0.8	4.4	3.5	2.8	0.6
180–184	2.9	0.1	0.0	0.07	.....	65–69	0.7	4.4	3.9	3.3	1.2
175–179	3.3	0.2	0.0	0.04	.....	60–64	0.6	4.9	4.6	3.6	0.7
170–174	4.3	0.3	0.2	0.1	.....	55–59	0.5	5.2	4.4	4.6	1.3
165–169	4.9	0.3	0.2	0.04	.....	50–54	0.4	5.1	5.3	5.4	1.5
160–164	5.3	0.4	0.1	0.2	.....	45–49	0.3	5.4	5.4	5.1	2.1
155–159	5.8	0.5	0.2	0.1	.....	40–44	0.1	5.3	6.3	6.3	2.9
150–154	6.1	0.7	0.2	0.04	.....	35–39	0.1	5.3	5.7	6.5	3.7
145–149	6.2	0.8	0.4	0.07	.....	30–34	0.1	5.3	5.9	7.2	4.6
140–144	5.9	0.8	0.6	0.4	.....	25–29	0.0	4.9	6.4	6.4	5.3
135–139	5.9	1.0	0.6	0.2	.....	20–24	0.0	4.4	6.5	6.6	7.3
130–134	6.0	1.3	0.6	0.3	.....	15–19	0.0	4.0	5.4	7.9	9.5
125–129	4.9	1.4	0.6	0.5	.....	10–14	.....	3.0	4.5	7.6	13.4
120–124	5.5	1.4	0.9	0.5	.....	5– 9	0.0	2.2	3.7	5.9	20.2
115–119	4.5	1.8	1.2	0.8	.....	0– 4	.....	1.0	3.8	3.7	23.4
110–114	4.1	2.1	1.1	0.9	.....						
105–109	3.7	2.3	1.6	1.1	0.2	Number of cases	12,586	51,620	4,162	2,850	1,709
100–104	3.2	2.5	1.8	1.2	0.4	Median score	139.2	58.9	46.7	38.6	12.4
95– 99	2.8	2.9	2.0	2.1	.....						

TABLE 306.—*Per cent distribution of total beta scores made by recruits of different groups.*

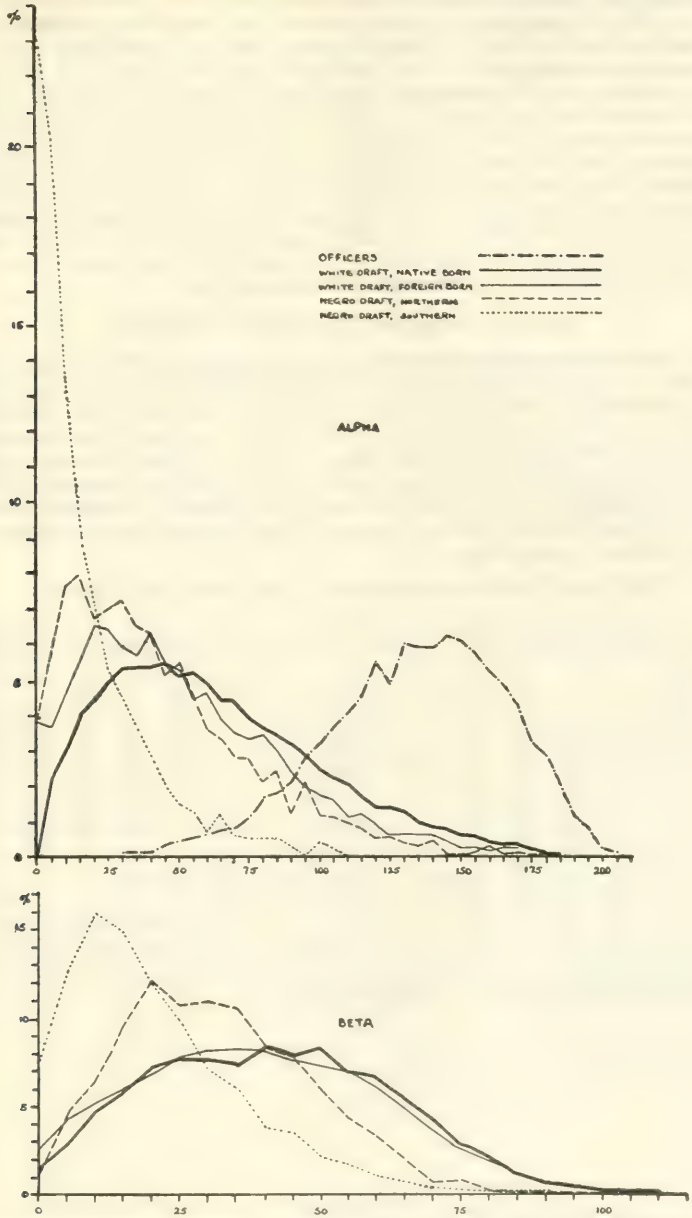
Beta score.	White draft, native born.	White draft, foreign born.	Colored draft, North.	Colored draft, South.	Beta score.	White draft, native born.	White draft, foreign born.	Colored draft, North.	Colored draft, South.
115–118	0.0	0.0	.....	.....	45–49	7.9	7.6	7.8	3.5
110–114	0.0	0.0	.....	.....	40–44	8.4	8.1	8.4	3.8
105–109	0.1	0.0	.....	.....	35–39	7.3	8.2	10.5	6.1
100–104	0.3	0.2	0.1	0.1	30–34	7.6	8.1	10.9	7.1
95– 99	0.4	0.4	0.0	0.0	25–29	7.7	7.7	10.7	10.0
90– 94	0.7	0.7	0.2	0.1	20–24	7.1	6.8	12.2	12.0
85– 89	1.1	1.1	0.1	0.1	15–19	5.7	5.9	9.6	14.9
80– 84	2.1	2.0	0.2	0.1	10–14	4.7	5.2	6.5	15.9
75– 79	2.9	2.5	0.8	0.3	5– 9	2.8	4.1	4.5	12.6
70– 74	4.3	3.6	0.7	0.4	0– 4	1.5	2.6	1.2	7.3
65– 69	5.6	5.0	2.1	0.8					
60– 64	6.6	6.1	3.3	1.1	Number of cases	11,879	5,803	1,737	3,438
55– 59	7.0	7.0	4.3	1.7	Median score	43.4	40.9	32.5	19.8
50– 54	8.2	7.3	5.9	2.1					

Examination beta, it will be remembered, was given to men unable to read and write readily in English, or who had not reached a given school grade, usually 4, 5, or 6. The proportion of men given beta was naturally very different among southern negroes, for instance, from what it was among native-born white recruits. The graphs showing distributions on alpha and beta are on a per cent basis and appear the same size, but the proportions of each group which went to alpha and to beta are as shown in table 307.

TABLE 307.

Classification by examination.	Officers.	Native-born white draft.	Foreign white draft.	Northern negro draft.	Southern negro draft.
Per cent given alpha	100	85.7	44.1	67.2	34.8
Per cent given beta	0	14.3	55.9	32.8	65.2
Total number in group	12,396	63,499	9,965	4,256	5,147

When these intelligence distributions are compared with the schooling distributions just shown for these same groups, the following observation may be made: The better educated the group, the better its record on the intelligence examinations; or, equally truly, the better the intelligence rating a group can make, the more education it has obtained. The only point on which this correspondence fails is that the northern negro draft group is better



FIGS. 29 and 30. Distribution of alpha and beta scores. These figures show the distribution of intelligence scores for the total groups here under comparision.

schooled though less intelligent than the foreign draft group; it is just in line with this discrepancy, too, that the southern negro group, lowest in each comparison, is nevertheless much farther removed from the others in intelligence rating than it is in schooling. The normal relation between the intelligence of a race and its interest in the training of its youth, one might say, has been upset by contact with a highly educated civilization, which has enormously increased the time the negro spends on education without correspondingly increasing his intelligence (as measured by these examinations). The position of Army officers in the two comparisons also falls in line here; in each respect it holds the highest position, but is much farther separated from the other groups in schooling than it is in intelligence. This greatly increased education, in other words, is not accompanied by an equal increase in the intelligence rating; in the latter the distributions for officers and white draft still overlap appreciably, while schooling separates them quite sharply. The alpha and beta median scores for these groups appear at the foot of the corresponding distribution tables.

SECTION 3.—*Intelligence as independent of schooling.*

When the entire groups described in the previous paragraphs (officers, native born and foreign white draft, and northern and southern negro draft) are broken up into subgroups according to schooling, a series of interesting comparisons becomes evident. The schooling groups used are 0–4 years, 5–8 years, high school 1–4 years, college 1–4 years, and graduate 1 or more years. (See tables 308 to 316, figures 31 to 39.) (Statements previously made regarding the proportion in which each group had to take examination beta should be called to mind in this connection.) Again, it is obvious that schooling and intelligence are related. Within each group, subgroups which are successively better schooled make successively better showing in intelligence examinations.[1]

TABLE 308.—*Per cent distribution of alpha scores. Officer groups of different schooling.*

Alpha score.	Grades, 0–4.	Grades, 5–8.	High school.	College, 1–4.	College, 5 and over.	Total.	Alpha score.	Grades, 0–4.	Grades, 5–8.	High school.	College, 1–4.	College, 5 and over.	Total.
205–212	.....	.....	.....	0.1	0.0	0.1	95–99	6.2	5.2	3.2	2.5	2.1	2.8
200–204	.....	.....	0.0	0.3	0.4	0.2	90–94	1.6	5.7	2.8	1.7	1.6	2.1
195–199	.....	0.2	0.3	0.9	1.1	0.8	85–89	3.1	5.9	2.2	1.5	1.2	1.8
190–194	.....	.....	0.6	1.4	1.8	1.2	80–84	1.6	5.3	2.1	1.2	1.6	1.7
185–189	1.6	0.2	1.2	2.2	2.7	2.0	75–79	4.7	2.5	1.8	0.8	0.9	1.1
180–184	.....	1.3	1.5	3.3	3.6	2.9	70–74	3.1	3.9	1.3	0.4	0.6	0.8
175–179	1.6	0.5	1.6	3.8	4.5	3.3	65–69	.....	1.3	1.2	0.6	0.6	0.7
170–174	.....	0.7	2.5	5.1	4.7	4.3	60–64	.....	1.8	0.6	0.4	0.6	0.6
165–169	3.1	0.8	4.4	5.4	5.4	4.9	55–59	.....	3.2	0.4	0.3	0.3	0.5
160–164	1.6	2.2	4.2	5.9	5.9	5.3	50–54	20.1	1.3	0.4	0.3	0.3	0.4
155–159	3.1	1.5	5.0	6.5	5.5	5.8	45–49	1.6	1.3	0.4	0.2	0.2	0.3
150–154	1.6	2.8	5.7	6.6	5.9	6.1	40–44	.....	0.3	0.2	0.0	.....	0.1
145–149	4.7	3.3	6.4	6.3	6.7	6.2	35–39	1.6	0.7	0.1	0.1	0.0	0.1
140–144	4.7	3.5	5.6	6.0	6.2	5.9	30–34	1.6	0.5	0.1	0.1	0.0	0.1
135–139	9.3	3.9	5.8	6.0	5.8	5.9	25–29	.....	0.2	0.0	0.0	0.1	0.0
130–134	4.7	4.4	6.7	5.9	6.2	6.0	20–24	.....	0.3	0.0	.....	.....	0.0
125–129	.....	4.7	5.8	4.8	4.7	4.9	15–19	.....	0.2	.....	0.0	.....	0.0
120–124	7.8	4.5	6.5	5.6	4.4	5.5	10–14	.....	.....	.....	.....	.....	.....
115–119	6.2	6.1	5.0	4.2	4.4	4.5	5– 9	.....	0.2	.....	.....	.....	0.0
110–114	1.6	6.4	5.5	3.6	3.4	4.1							
105–109	1.6	5.3	4.5	3.4	3.2	3.7	Number of cases	64	596	2,532	7,571	1,823	12,586
100–104	1.6	7.9	4.7	2.3	3.3	3.2	Median score	112.5	107.0	131.1	143.2	143.5	139.2

[1] A series of figures below shows further that the converse of this proposition is equally true; within each group, subgroups with successively higher intelligence rating are successively better schooled. See section 4 on correlations.

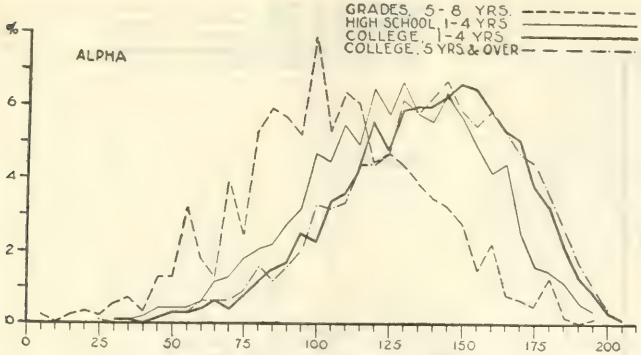


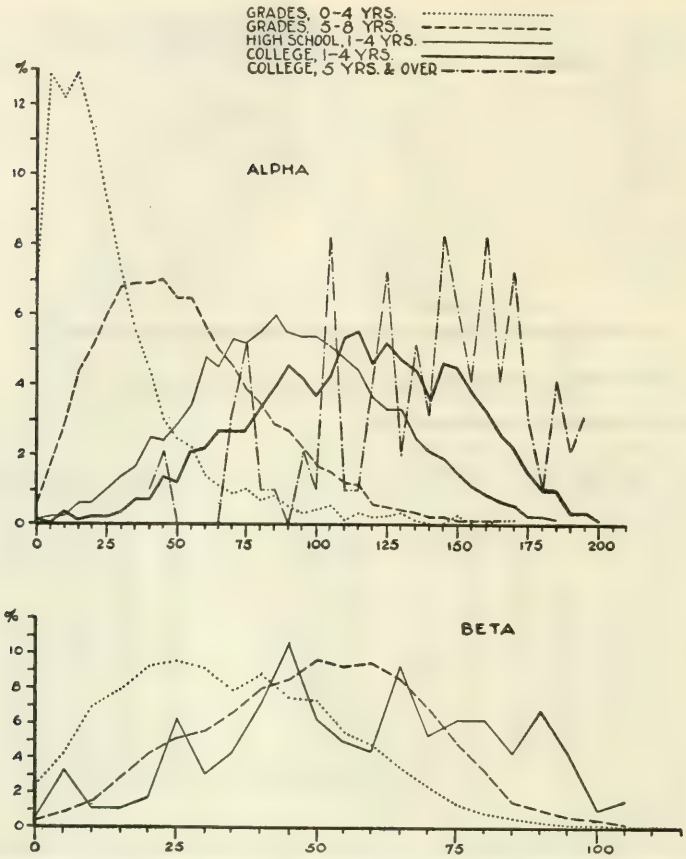
FIG. 31. Distribution of alpha scores. The group of officers is here broken up according to schooling to show the intelligence scores which successive amounts of schooling accompany.

TABLE 309.—*Per cent distribution of alpha scores. White draft (native born of Groups I, II, III) of different schooling.*

Alpha score.	Grades, 0–4.	Grades, 5–8.	High school, 1–4.	College, 1–4.	College, 5 and over.	Total.	Alpha score.	Grades, 0–4.	Grades, 5–8.	High school, 1–4.	College, 1–4.	College, 5 and over.	Total.
205–212	.....	.....	0.0	.....	.....	0.0	90– 94	0.5	2.7	5.5	4.5	.....	3.2
200–204	.....	.....	0.0	0.1	.....	0.0	85– 89	0.8	2.9	6.0	3.9	1.0	3.4
195–199	.....	.....	0.0	0.3	3.1	0.0	80– 84	0.7	3.5	5.5	3.4	1.0	3.6
190–194	.....	.....	0.0	0.3	2.1	0.0	75– 79	1.0	3.9	6.2	2.7	5.2	3.9
185–189	.....	0.0	0.01	1.0	4.1	0.1	70– 74	0.9	4.6	5.3	2.7	3.1	4.4
180–184	.....	0.0	0.2	1.0	1.0	0.1	65– 69	1.1	5.0	4.5	2.7	.....	4.4
175–179	0.0	0.0	0.2	1.5	3.1	0.2	60– 64	1.4	5.7	4.8	2.2	.....	4.9
170–174	0.1	0.0	0.5	2.2	7.2	0.3	55– 59	2.2	6.5	3.4	2.1	.....	5.2
165–169	0.1	0.1	0.6	2.6	4.1	0.3	50– 54	2.5	6.5	2.9	1.2	.....	5.1
160–164	0.0	0.1	0.8	3.3	8.2	0.4	45– 49	3.0	7.0	2.4	1.4	2.1	5.4
155–159	0.0	0.1	1.1	3.8	4.1	0.5	40– 44	4.4	6.9	2.5	0.7	1.0	5.3
150–154	0.2	0.1	1.5	4.5	6.2	0.7	35– 39	5.5	6.9	1.7	0.7	.....	5.3
145–149	0.0	0.2	1.9	4.6	8.2	0.8	30– 34	7.2	6.8	1.4	0.3	.....	5.3
140–144	0.0	0.2	2.1	3.5	3.1	0.8	25– 29	9.2	6.0	1.0	0.2	.....	4.9
135–139	0.1	0.3	2.5	4.4	5.1	1.0	20– 24	11.3	5.1	0.6	0.2	.....	4.4
130–134	0.3	0.4	3.3	4.7	2.1	1.3	15– 19	12.9	4.4	0.6	0.1	.....	4.0
125–129	0.2	0.5	3.3	5.2	7.2	1.4	10– 14	12.2	2.9	0.2	0.3	.....	3.0
120–124	0.2	0.6	3.6	4.6	4.1	1.4	5– 9	12.9	1.8	0.2	0.0	.....	2.2
115–119	0.3	1.1	4.4	5.5	1.0	1.8	0– 4	7.2	0.6	0.1	0.1	.....	1.0
110–114	0.1	1.2	4.7	5.4	1.0	2.1							
105–109	0.5	1.5	5.1	4.2	8.2	2.3	Number of cases	4,253	33,424	10,715	3,131	97	51,620
100–104	0.4	1.7	5.4	3.7	1.0	2.5	Median score	22.0	51.1	92.1	117.8	145.9	58.9
95– 99	0.3	2.2	5.4	4.2	2.1	2.9							

TABLE 310.—*Per cent distribution of beta scores. White draft (native born of Groups I, II, III) of different schooling.*

Beta score.	Grades, 0–4.	Grades, 5–8.	High school, 1–4.	College, 1–4.	Total.	Beta score.	Grades, 0–4.	Grades, 5–8.	High school, 1–4.	College, 1–4.	Total.
115–118	0.01	0.06	.....	.....	0.0	45– 49	7.4	8.7	10.5	5.4	7.9
110–114	0.01	0.06	.....	.....	0.0	40– 44	8.8	7.95	7.2	5.4	8.4
105–109	0.0	0.1	1.7	8.1	0.1	35– 39	7.9	6.65	4.4	2.7	7.3
100–104	0.1	0.4	1.1	8.1	0.3	30– 34	9.1	5.5	3.3	5.4	7.6
95– 99	0.1	0.6	4.4	8.1	0.4	25– 29	9.5	5.1	6.1	5.4	7.7
90– 94	0.3	1.1	6.6	2.7	0.7	20– 24	9.2	4.2	1.7	.....	7.1
85– 89	0.6	1.75	4.4	2.7	1.1	15– 19	7.8	2.9	1.1	.....	5.7
80– 84	0.9	3.4	6.1	10.7	2.1	10– 14	6.9	1.5	1.1	2.7	4.7
75– 79	1.4	5.0	6.1	5.4	2.9	5– 9	4.2	0.85	3.3	.....	2.8
70– 74	2.5	6.9	5.5	5.4	4.3	0– 4	2.4	0.32	0.6	.....	1.5
65– 69	3.5	8.6	9.4	5.4	5.6						
60– 64	4.8	9.4	4.4	2.7	6.6	Number of cases	6,947	4,714	181	37	11,879
55– 59	5.6	9.3	5.0	5.4	7.0	Median score	35.7	53.3	59.7	71.3	43.4
50– 54	7.3	9.6	6.1	8.1	8.2						



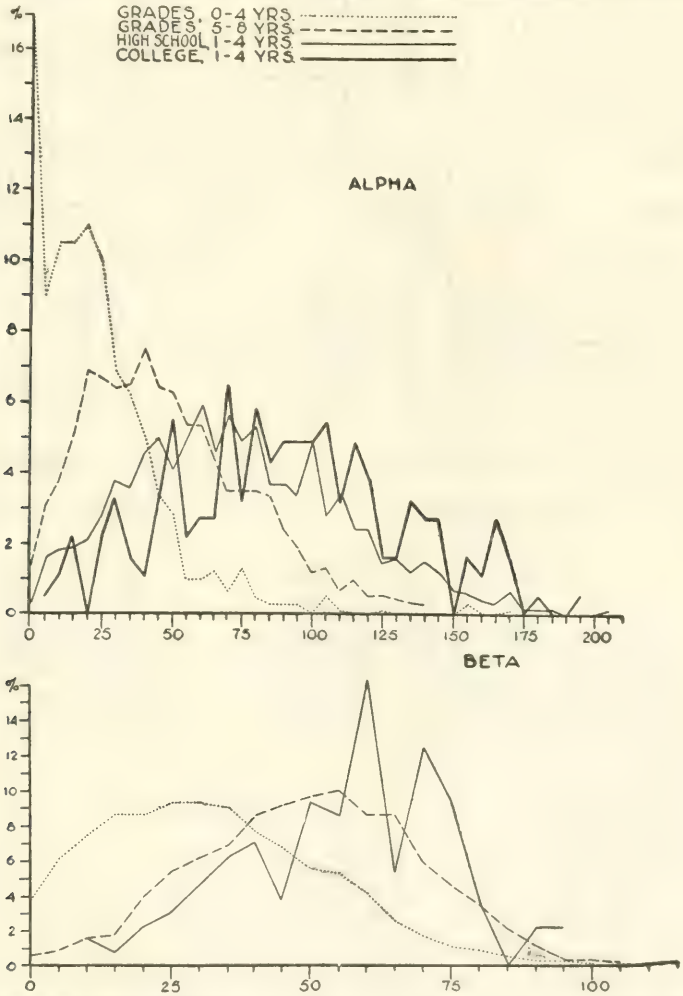
FIGS. 32 and 33. Distribution of alpha and beta scores. The white native-born draft group is here broken up according to schooling to show the intelligence scores which successive amounts of schooling accompany.

TABLE 311.—*Per cent distribution of alpha scores. White draft (foreign of Groups I, II, III) of different schooling.*

Alpha score.	Grades, 0-4.	Grades, 5-8.	High school, 1-4.	College, 1-4.	College, 5 and over.	Total.	Alpha score.	Grades, 0-4.	Grades, 5-8.	High school, 1-4.	College, 1-4.	College, 5 and over.	Total.
205-212	.....	.....	0.1	.....	.....	0.0	90- 94	0.3	2.4	3.7	4.9	7.7	2.4
200-204	.....	.....	.....	.....	.....	.....	85- 89	0.3	3.4	3.7	4.3	.....	3.0
195-199	.....	.....	.....	0.5	.....	0.0	80- 84	0.6	3.5	5.3	5.8	7.7	3.4
190-194	.....	.....	.....	.....	.....	.....	75- 79	1.3	3.5	4.9	3.2	.....	3.3
185-189	.....	.....	0.1	.....	.....	0.0	70- 74	0.7	3.5	5.6	6.5	7.7	3.5
180-184	.....	0.0	0.1	0.5	.....	0.0	65- 69	1.3	4.5	4.6	2.7	.....	3.9
175-179	.....	0.0	0.1	.....	.....	0.0	60- 64	1.1	5.4	5.9	2.7	.....	4.6
170-174	0.1	.....	0.6	1.6	7.7	0.2	55- 59	1.1	5.4	5.0	2.2	.....	4.4
165-169	.....	.....	0.3	2.7	.....	0.2	50- 54	2.8	6.3	4.1	5.4	.....	5.3
160-164	.....	0.0	0.4	1.1	.....	0.1	45- 49	3.4	6.4	5.0	3.2	.....	5.4
155-159	0.3	0.0	0.6	1.6	.....	0.2	40- 44	5.1	7.5	4.6	1.1	7.7	6.3
150-154	.....	0.0	0.7	.....	.....	0.2	35- 39	6.2	6.5	3.6	1.6	.....	5.7
145-149	.....	0.0	1.2	2.7	.....	0.4	30- 34	6.9	6.4	3.8	3.2	7.7	5.9
140-144	.....	0.3	1.5	2.7	.....	0.6	25- 29	10.0	6.7	2.8	2.2	.....	6.4
135-139	.....	0.3	1.2	3.2	7.7	0.6	20- 24	11.0	6.9	2.1	.....	7.7	6.5
130-134	.....	0.4	1.6	1.6	.....	0.6	15- 19	10.5	5.1	1.9	2.2	.....	5.4
125-129	0.1	0.5	1.5	1.6	7.7	0.6	10- 14	10.5	3.8	1.8	1.1	7.7	4.5
120-124	.....	0.5	2.4	3.8	7.7	0.9	5- 9	9.0	3.1	1.6	0.5	.....	3.7
115-119	.....	1.0	2.4	4.9	7.7	1.2	0- 4	16.7	1.4	0.3	.....	.....	3.8
110-114	0.1	0.7	3.4	3.2	.....	1.1							
105-109	0.6	1.3	2.8	5.4	.....	1.6	Number of cases	711	2,578	675	185	13	4,162
100-104	.....	1.2	4.9	4.9	7.7	1.8	Median score	21.4	47.2	72.4	91.9	92.5	46.7
95- 99	0.3	1.9	3.4	4.9	.....	2.0							

TABLE 312.—*Per cent distribution of beta scores. White draft (foreign born of Groups I, II, III) of different schooling.*

Beta score.	Grades, 0–4.	Grades, 5–8.	High school, 1–4.	College, 1–4.	College, 5 and over.	Total.	Beta score.	Grades, 0–4.	Grades, 5–8.	High school, 1–4.	College, 1–4.	College, 5 and over.	Total.
115–118	.....	0.0	.....	.....	.....	0.0	45–49	6.8	9.1	3.9	6.7	.....	7.6
110–114	.....	0.0	.....	.....	.....	0.0	40–44	7.8	8.6	7.0	6.7	.....	8.1
105–109	0.0	0.1	.....	.....	.....	0.0	35–39	9.0	7.0	6.2	.....	.....	8.2
100–104	0.1	0.3	.....	.....	.....	0.2	30–34	9.4	6.1	4.7	6.7	.....	8.1
95– 99	0.3	0.3	2.3	.....	.....	0.4	25–29	9.4	5.3	3.1	6.7	.....	7.7
90– 94	0.3	1.2	2.3	.....	.....	0.7	20–24	8.6	4.0	2.3	.....	.....	6.8
85– 89	0.5	2.1	.....	.....	.....	1.1	15–19	8.6	1.8	0.8	.....	.....	5.9
80– 84	0.9	3.6	3.9	20.0	.....	2.0	10–14	7.5	1.6	1.6	.....	.....	5.2
75– 79	1.0	4.6	9.4	.....	.....	2.5	5– 9	6.2	0.9	.....	.....	.....	4.1
70– 74	1.8	6.0	12.5	6.7	.....	3.6	0– 4	3.9	0.5	.....	.....	.....	2.6
65– 69	2.8	8.7	5.5	6.7	.....	5.0							
60– 64	4.2	8.7	16.4	6.7	.....	6.1	Number of cases	3,540	2,119	128	15	1	5,803
55– 59	5.1	10.0	8.6	20.0	.....	7.0	Median score	33.1	52.7	60.7	57.5	52.5	40.9



FIGS. 34 and 35. Distribution of alpha and beta scores. The white foreign-born draft group is here broken up according to schooling to show the intelligence scores which successive amounts of schooling accompany.

TABLE 313.—*Per cent distribution of alpha scores. Colored draft, North (Group V), of different schooling.*

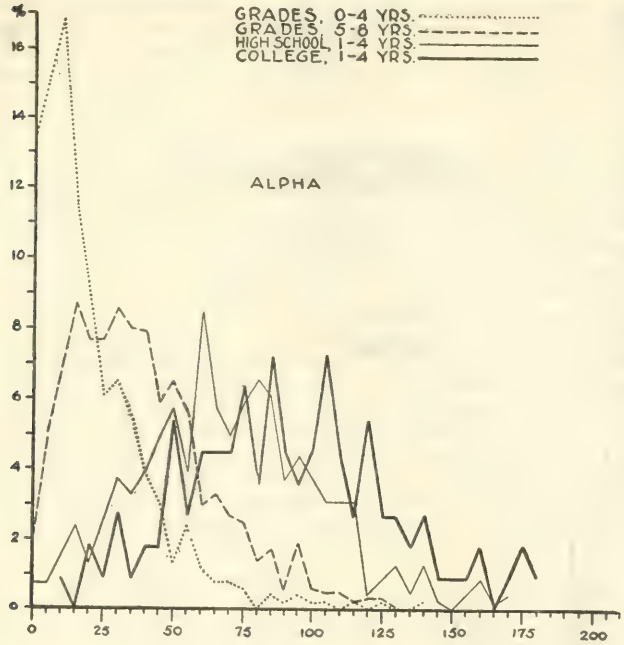
Alpha score.	Grades, 0–4.	Grades, 5–8.	High school, 1–4.	College, 1–4.	College, 5 and over.	Alpha score.	Grades, 0–4.	Grades, 5–8.	High school, 1–4.	College, 1–4.	College, 5 and over.
185–189	.....	0.06	.....	.....	0.04	80–84	.....	1.5	6.6	3.6	2.1
180–184	.....	.....	.....	0.9	0.04	75–79	0.6	2.5	5.9	6.3	2.8
175–179	.....	.....	.....	1.8	0.07	70–74	0.8	2.7	5.0	4.5	2.8
170–174	.....	.....	0.4	0.9	0.1	65–69	0.8	3.3	5.7	4.5	3.3
165–169	.....	.....	0.2	.....	0.04	60–64	1.2	3.0	8.5	4.5	3.6
160–164	.....	.....	0.9	1.8	0.2	55–59	2.4	5.6	3.9	2.7	4.6
155–159	.....	.....	0.4	0.9	0.1	50–54	1.4	6.5	5.7	5.4	5.4
150–154	.....	.....	.....	0.9	0.04	45–49	3.0	5.9	4.8	1.8	5.1
145–149	.....	.....	0.2	0.9	0.07	40–44	3.9	7.9	3.9	1.8	6.3
140–144	0.2	0.06	1.3	2.7	0.4	35–39	5.5	8.0	3.3	0.9	6.5
135–139	.....	0.06	0.4	1.8	0.2	30–34	6.5	8.6	3.7	2.7	7.2
130–134	.....	.....	1.3	2.7	0.3	25–29	6.1	7.7	2.6	0.9	6.4
125–129	0.2	0.3	0.9	2.7	0.5	20–24	8.9	7.7	1.3	1.8	6.6
120–124	.....	0.3	0.4	5.4	0.5	15–19	11.6	8.7	2.4	.....	7.9
115–119	0.2	0.2	3.1	2.7	0.8	10–14	16.8	6.9	1.5	0.9	7.6
110–114	.....	0.5	3.1	4.5	0.9	5– 9	15.2	5.0	0.7	.....	5.9
105–109	0.2	0.5	3.1	7.2	1.1	0– 4	13.4	2.0	0.7	.....	3.7
100–104	0.2	0.6	3.7	4.5	1.2						
95– 99	0.4	1.9	4.4	3.6	2.1	Number of cases	507	1,775	457	111	2,850
90– 94	0.2	0.6	3.7	4.5	1.2	Median score	17.0	37.2	71.2	90.5	38.6
85– 89	0.4	1.7	6.1	7.2	2.4						

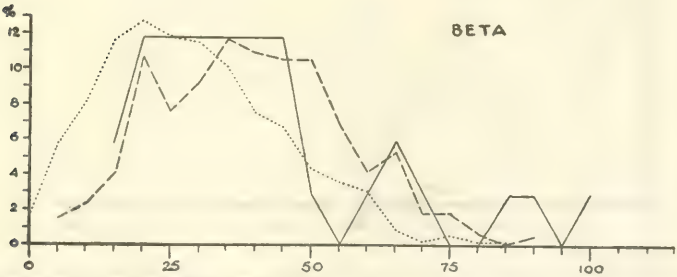
TABLE 314.—*Per cent distribution of beta scores. Colored draft, North (Group V), of different schooling.*

Beta score.	Grades, 0–4.	Grades, 5–8.	High school, 1–4, and college, 1–4	Total.	Beta score.	Grades, 0–4.	Grades, 5–8.	High school, 1–4, and college, 1–4.	Total.
100–104	.....	.....	2.6	0.1	40–44	7.5	10.9	10.5	8.4
95– 99	.....	.....	0.0	0.0	35–39	10.1	11.6	10.5	10.5
90– 94	.....	0.5	5.3	0.2	30–34	11.5	9.2	10.5	10.9
85– 89	0.1	.....	2.6	0.1	25–29	11.8	7.6	10.5	10.7
80– 84	0.1	0.7	0.0	0.2	20–24	12.7	10.7	10.5	12.2
75– 79	0.5	1.8	0.0	0.8	15–19	11.6	4.1	5.3	9.6
70– 74	0.2	1.8	5.3	0.7	10–14	8.1	2.3	0.0	6.5
65– 69	0.9	5.3	5.3	2.1	5– 9	5.8	1.4	0.0	4.5
60– 64	3.0	4.1	2.6	3.3	0– 4	1.6	0.0	0.0	1.2
55– 59	3.6	6.9	0.0	4.3					
50– 54	4.3	10.6	5.3	5.9	Number of cases	1,264	434	38	1,737
45– 49	6.7	10.6	13.2	7.8	Median score	29.3	41.5	41.3	32.5

TABLE 315.—*Per cent distribution of alpha scores. Colored draft, South (Group IV) of different schooling.*

Alpha score.	Grades, 0–4.	Grades, 5–8.	High school, 1–4.	College, 1–4.	Total.	Alpha score.	Grades, 0–4.	Grades, 5–8.	High school, 1–4.	College, 1–4.	Total.
105–109	.....	0.1	2.1	.....	0.2	40– 44	0.6	4.3	7.3	.....	2.9
100–104	0.1	0.3	1.0	5.7	0.4	35– 39	1.6	5.0	5.2	8.6	3.7
95– 99	.....	.....	.....	.....	.....	30– 34	1.9	6.7	6.3	2.9	4.6
90– 94	.....	0.2	2.1	2.9	0.3	25– 29	2.2	7.3	10.4	2.9	5.3
85– 89	.....	0.2	3.1	11.4	0.5	20– 24	6.1	8.8	2.1	5.7	7.3
80– 84	.....	0.3	4.2	2.9	0.5	15– 19	8.0	11.9	3.1	.....	9.5
75– 79	0.1	0.5	2.1	2.9	0.5	10– 14	14.7	13.7	6.3	.....	13.4
70– 74	.....	0.3	5.2	5.7	0.6	5– 9	25.2	18.8	5.2	.....	20.2
65– 69	.....	0.7	8.3	17.1	1.2	0– 4	39.0	14.3	3.1	.....	23.4
60– 64	.....	0.9	2.1	5.7	0.7						
55– 59	0.1	1.2	7.3	8.6	1.3	Number of cases	692	886	96	35	1,709
50– 54	.....	1.9	6.3	8.6	1.5	Median score	7.2	16.3	45.7	63.8	12.4
45– 49	0.4	2.5	7.3	8.6	2.1						

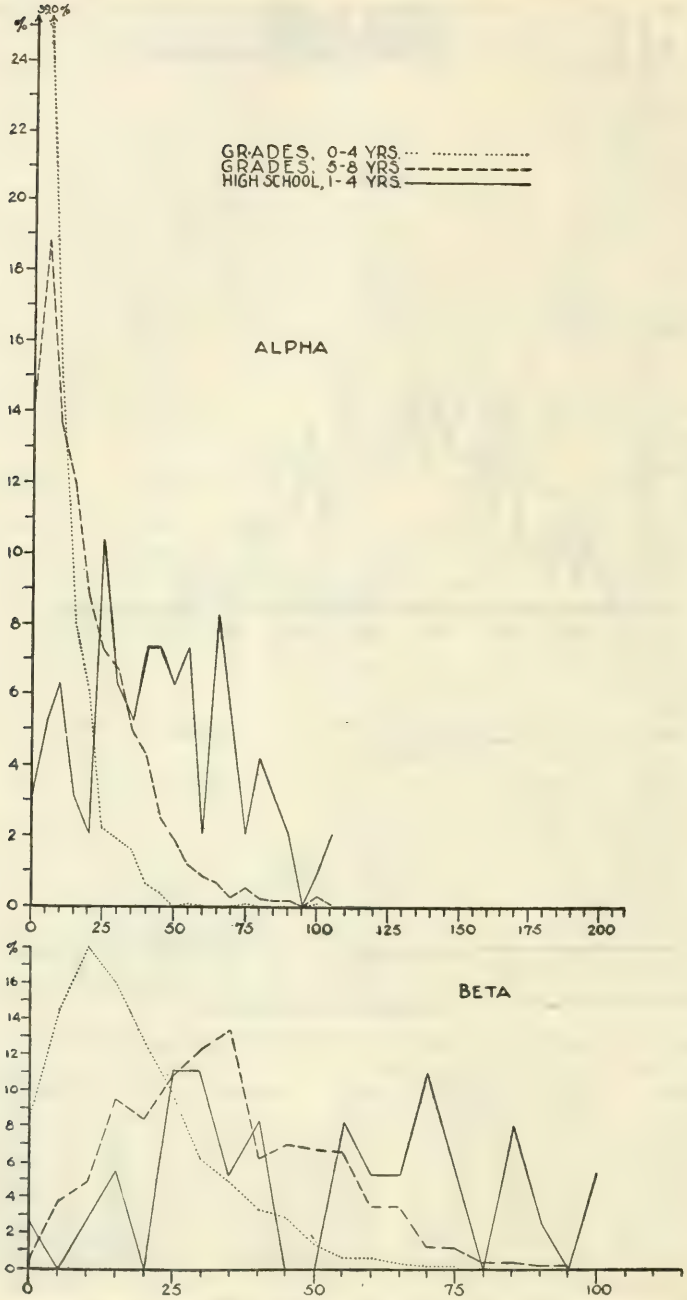




FIGS. 36 and 37. Distribution of alpha and beta scores. The northern negro draft group is here broken up to show the intelligence scores which successive amounts of schooling accompany.

TABLE 316.—*Per cent distribution of beta scores. Colored draft, South (Group IV) of different schooling.*

Beta score.	Grades, 0–4.	Grades, 5–8.	High school, 1–4.	College, 1–4.	Total.	Beta score.	Grades, 0–4.	Grades, 5–8.	High school, 1–4.	College, 1–4.	Total
100–104	.....	.....	5.6	.....	0.1	40–44	3.3	6.2	8.3	.....	3.8
95–99	.....	0.2	.....	.....	0.0	35–39	4.9	13.3	5.6	.....	6.1
90–94	.....	0.2	2.8	.....	0.1	30–34	6.1	12.3	11.1	.....	7.1
85–89	.....	0.4	8.3	.....	0.1	25–29	9.9	10.8	11.1	.....	10.0
80–84	0.0	0.4	.....	.....	0.1	20–24	12.8	8.3	.....	.....	12.0
75–79	0.1	1.2	5.6	33.3	0.3	15–19	16.0	9.5	5.6	.....	14.9
70–74	0.1	1.3	11.1	.....	0.4	10–14	18.0	4.8	2.8	.....	15.9
65–69	0.3	3.5	5.6	.....	0.8	5–9	14.4	3.7	.....	.....	12.6
60–64	0.6	3.5	5.6	.....	1.1	0–4	8.6	0.4	2.8	.....	7.3
55–59	0.7	6.5	8.3	33.3	1.7						
50–54	1.3	6.7	.....	33.3	2.1	Number of cases	2,880	519	36	3	3,438
45–49	2.9	6.9	.....	.....	3.5	Median score	17.8	35.1	56.7	57.5	19.8



FIGS. 38 and 39. Distribution of alpha and beta scores. The southern negro draft group is here broken up to show the intelligence scores which successive amounts of schooling accompany.

The differences in intelligence between subgroups of different schooling are greatest in the native-born white draft, where the range of intelligence is widest. They are least in the officer and southern negro draft groups, where the range of intelligence is least; officers are already highly selected on a basis in which intelligence plays an important part so that even the least schooled group of officers is highly intelligent, while even the best educated southern negroes are of relatively low intelligence.

Tables 317 to 323 and figures 40 to 49 make comparisons between subgroups equally schooled, taken from our original groups (officers, native-born and foreign white draft, and northern and southern negroes). The schooling groups used in this case were the fourth grade, eighth grade, fourth year high school, and fourth year college groups. In tables 317 and 318 and figures 40 and 41 appear all the recruits who reported that they stopped school at grade four. The grade standards, of course, are not identical all over the country, especially as between schools for white and for negro children, so that "fourth grade schooling" doubtless varies in meaning from group to group, but this variability certainly can not account for the clear intelligence differences between groups. In the alpha curves for grade four, the most interesting feature is that the foreign appears better than the native born draft, though the difference is not great. This relation is easy to understand when it is considered that there may be greater pressure to continue in school in native than in foreign communities in this country, and sometimes better school opportunities; native-born children who drop out at this age are likely to do so because of low intelligence, whereas the foreign-born children may more often leave for other reasons. The parts of the two groups who took examination beta make very similar scores. The extremely poor showing of the southern negroes is only the more striking when it is recalled that this fourth grade group has more than the average schooling for southern negroes.

TABLE 317.—*Per cent distribution of alpha scores of various groups, based on schooling level of fourth grade.*

Alpha score.	White draft, native born.	White draft, foreign born.	Colored draft, northern.	Colored draft, southern.	Alpha score.	White draft, native born.	White draft, foreign born.	Colored draft, northern.	Colored draft, southern.
170-174	0.1	0.3	.....	.....	75- 79	0.8	2.3	0.3	0.3
165-169	0.04	.....	.....	.....	70- 74	1.0	1.1	0.6	.....
160-164	0.04	.....	.....	.....	65- 69	1.0	2.0	1.3	.....
155-159	0.04	0.6	.....	.....	60- 64	1.4	1.7	1.9	.....
150-154	0.07	.....	.....	.....	55- 59	2.3	1.1	2.6	0.3
145-149	0.07	.....	.....	.....	50- 54	3.2	2.5	2.2	.....
140-144	0.07	.....	0.3	.....	45- 49	3.2	3.1	3.5	.....
135-139	.....	.....	.....	.....	40- 44	5.0	6.5	5.1	0.8
130-134	0.3	.....	.....	.....	35- 39	6.2	8.7	7.4	2.5
125-129	0.1	0.3	0.3	.....	30- 34	7.9	8.7	7.4	2.8
120-124	0.1	.....	.....	.....	25- 29	10.6	13.0	6.7	3.4
115-119	0.1	.....	.....	.....	20- 24	11.9	10.7	9.0	6.2
110-114	0.04	0.3	.....	.....	15- 19	13.3	12.4	9.0	8.1
105-109	0.3	.....	0.3	.....	10- 14	11.3	9.3	17.0	16.6
100-104	0.1	.....	.0	0.3	5- 9	11.5	7.3	13.5	27.2
95- 99	0.3	0.6	0.3	.....	0- 4	5.7	6.2	10.9	31.2
90- 94	0.3	0.6	.0	.....					
85- 89	0.8	0.3	0.3	.....	Number of cases	2,773	355	312	356
80- 84	0.7	0.6	.0	.....	Median score	23.4	26.6	19.8	8.4

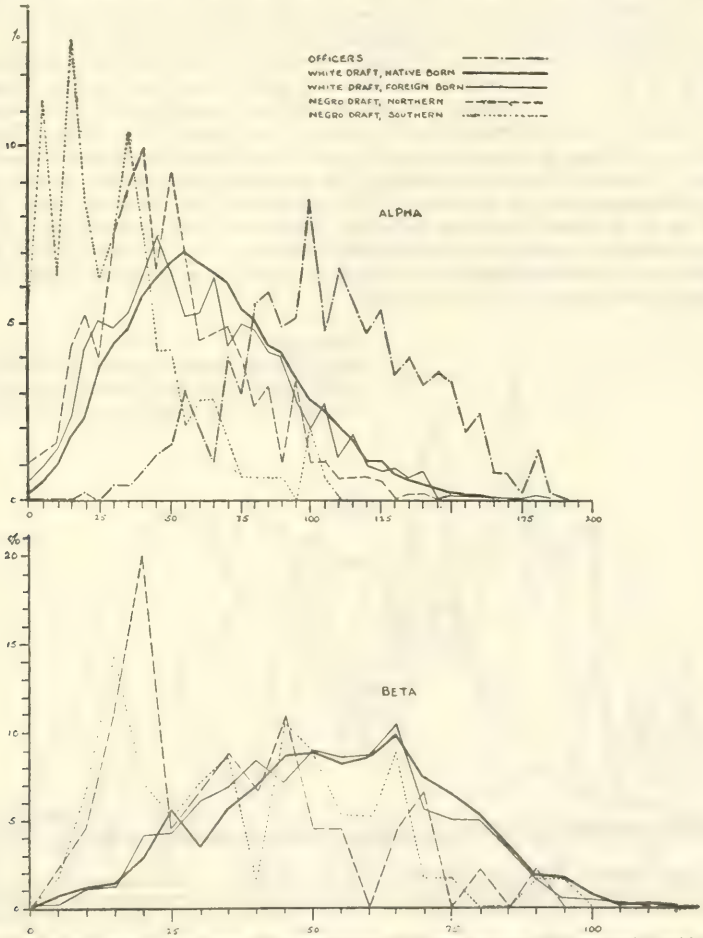
TABLE 318.—*Per cent distribution of beta scores of various groups, based on schooling level of fourth grade.*

Beta score.	White draft, native born.	White draft, foreign born.	Colored draft, northern.	Colored draft, southern.	Beta score.	White draft, native born.	White draft, foreign born.	Colored draft, northern.	Colored draft, southern.
100-104	.....	0.4	.....	.....	40-44	10.3	9.3	8.9	10.0
95- 99	0.1	1.4	.....	.....	35-39	8.7	9.8	12.0	8.1
90- 94	0.3	0.5	.....	.....	30-34	8.0	8.4	12.2	12.1
85- 89	0.8	1.7	.....	.....	25-29	8.2	6.4	10.0	10.2
80- 84	1.8	2.4	0.3	.....	20-24	6.6	6.0	12.0	12.5
75- 79	2.6	2.9	1.4	0.7	15-19	4.5	4.3	9.2	10.9
70- 74	4.0	3.3	0.6	0.2	10-14	1.5	1.4	3.3	10.4
65- 69	6.0	5.6	1.4	0.9	5- 9	1.3	1.3	1.7	5.3
60- 64	7.1	7.6	3.6	2.0	0- 4	0.8	0.9	0.3	3.1
55- 59	8.2	9.0	5.3	2.8					
50- 54	9.6	7.9	8.9	3.7	Number of cases	2,263	764	359	431
45- 49	9.6	9.4	8.9	7.2	Median score	45.0	46.1	35.5	28.8

FIGS. 40 and 41. Distribution of alpha and beta scores. These groups contain only recruits who reported that they were in the fourth grade when they left school. The comparison is then between the intelligence scores of white (native and foreign), and negro (northern and southern) recruits who had had equal school opportunities, i. e., fourth grade.

TABLE 319.—*Per cent distribution of alpha scores of various groups, based on schooling level of eighth grade.*

Alpha score.	Officers.	White draft, native born.	White draft, foreign born.	Colored draft, northern.	Colored draft, southern.	Alpha score.	Officers.	White draft, native born.	White draft, foreign born.	Colored draft, northern.	Colored draft, southern.
185–189	0.2	.....	.....	.....	.....	80–84	5.6	5.1	4.9	2.7	0.7
180–184	1.3	.....	0.1	.....	.....	75–79	3.0	5.4	5.0	4.0	0.7
175–179	0.2	.....	0.1	.....	.....	70–74	4.0	6.2	4.4	4.9	1.4
170–174	0.7	.....	.....	.....	.....	65–69	1.1	6.4	6.4	4.7	2.8
165–169	0.9	.....	.....	.....	.....	60–64	1.8	6.7	5.3	4.5	2.8
160–164	2.4	0.1	0.1	.....	.....	55–59	3.1	7.0	5.2	7.2	2.1
155–159	1.8	0.1	0.1	.....	.....	50–54	1.6	6.7	6.5	9.2	4.2
150–154	3.3	0.2	0.1	.....	.....	45–49	1.3	6.3	7.5	6.5	4.2
145–149	3.6	0.3	.....	.....	.....	40–44	0.0	5.7	6.4	9.9	7.6
140–144	3.3	0.4	0.8	0.2	.....	35–39	0.4	4.8	5.3	8.8	10.4
135–139	4.0	0.5	0.6	0.2	.....	30–34	0.4	4.4	4.9	7.2	7.6
130–134	3.6	0.7	0.9	.....	.....	25–29	0.0	3.4	5.1	4.0	6.3
125–129	5.4	1.1	0.8	0.5	.....	20–24	0.2	2.3	4.4	5.2	8.3
120–124	4.7	1.1	1.0	0.7	.....	15–19	.....	1.7	2.4	4.3	13.2
115–119	6.0	1.7	1.8	0.7	.....	10–14	.....	1.0	1.5	1.6	6.3
110–114	6.5	2.1	1.2	0.7	.....	5–9	.....	0.5	1.0	1.3	11.8
105–109	5.4	2.6	2.7	1.1	0.7	0–4	.....	0.2	0.6	1.1	5.6
100–104	8.5	2.9	2.0	1.1	2.1						
95–99	5.1	3.5	2.9	3.4	.....	Number of cases	448	14,899	928	555	144
90–94	4.9	4.2	4.1	1.1	0.7	Median score	108.1	64.4	59.4	50.0	28.9
85–89	5.8	4.4	4.2	3.2	0.7						



FIGS. 42 and 43. Distribution of alpha and beta scores. These groups contain only those who reported that they were in the eighth grade when they left school. The comparison is then between the intelligence scores of officers, white (native and foreign), and negro (northern and southern) recruits who had had equal school opportunities, i. e., eighth grade.

TABLE 320.—*Per cent distribution of beta scores of various groups, based on schooling level of eighth grade.*

Beta score.	White draft, native born.	White draft, foreign born.	Colored draft, northern.	Colored draft, southern.	Beta score.	White draft, native born.	White draft, foreign born.	Colored draft, northern.	Colored draft, southern.
110–114	0.3	.....	.....	.....	45–49	8.6	7.1	11.1	10.7
105–109	.....	0.4	.....	.....	40–44	6.9	8.4	6.7	1.8
100–104	0.8	0.6	.....	.....	35–39	5.8	6.9	8.9	8.9
95– 99	1.8	0.6	.....	1.8	30–34	3.5	6.0	6.7	7.1
90– 94	1.9	1.7	2.2	1.8	25–29	5.7	4.3	4.4	5.4
85– 89	3.6	3.5	.....	.....	20–24	2.9	4.1	20.0	7.1
80– 84	5.3	5.0	2.2	.....	15–19	1.4	1.5	11.1	14.3
75– 79	6.4	5.0	.....	1.8	10–14	1.1	1.1	4.4	7.1
70– 74	7.5	6.3	6.7	1.8	5– 9	0.8	0.2	2.2	1.8
65– 69	9.9	10.6	4.4	8.9	0– 4	.....	0.2	.....	.....
60– 64	8.5	8.6	.....	5.4					
55– 59	8.3	8.6	4.4	5.4	Number of cases	720	463	45	56
50– 54	8.9	8.9	4.4	8.9	Median score	57.6	55.7	35.6	39.0

When comparison is made between the corresponding groups of eighth-grade schooling (see tables 319 and 320, figures 42 and 43), similar results appear. The foreign-born group at this schooling level no longer surpasses the native-born group, but is not very different from it. The group of officers is sharply separated from the groups of recruits.

When groups of high-school and of college education are considered (see tables 321 and 322, figures 44 and 45) the beta groups are very small indeed and may be disregarded. Officers and recruits at this schooling level are less different in intelligence, but the foreign-born group of recruits is more different from the native born than at lower levels. Numbers of recruits who are college graduates, except the native-born white group, are too small to be significant. The native-born white recruits at this schooling level, however, do just about as well on examination alpha as do officers. This interesting shift is shown more clearly in figures 46 to 48, in which the alpha curves for these two groups are isolated. It may be that the intelligence necessary to graduate from college is requisite in an officer, but that college graduates who for one reason or another find themselves in the ranks are practically no less intelligent than those who become officers.

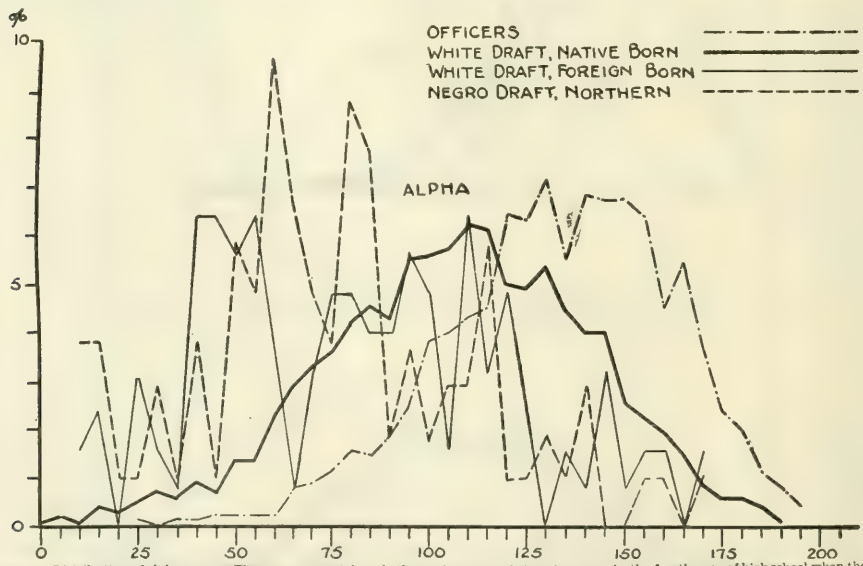


FIG. 44. Distribution of alpha scores. These groups contain only those who reported that they were in the fourth year of high school when they left school. The comparison is then between the intelligence scores of officers, white (native and foreign), and negro (northern) recruits who had had equal school opportunities, i. e., four years of high school. (Groups as well educated as this did not usually get into examination beta.)

TABLE 321.—*Per cent distribution of alpha scores of various groups, based on schooling level of 4 years of high school.*

Alpha score.	Officers.	White draft, native born.	White draft, foreign born.	Colored draft, northern.	Alpha score.	Officers.	White draft, native born.	White draft, foreign born.	Colored draft, northern.
195–199	0.4	.....	.....	.....	85–89	1.5	4.5	4.0	7.7
190–194	0.8	0.1	.....	.....	80–84	1.6	4.2	4.8	8.7
185–189	1.1	0.4	.....	.....	75–79	1.2	3.6	4.8	3.8
180–184	2.0	0.6	.....	.....	70–74	0.9	3.3	3.2	4.8
175–179	2.4	0.6	.....	.....	65–69	0.8	2.9	0.8	6.7
170–174	3.7	0.9	1.6	1.0	60–64	0.2	2.3	4.0	9.6
165–169	5.4	1.6	.....	.....	55–59	0.2	1.4	6.4	4.8
160–164	4.5	2.0	1.6	1.0	50–54	0.2	1.4	5.6	5.8
155–159	6.4	2.3	1.6	1.0	45–49	0.2	0.7	6.4	1.0
150–154	6.7	2.6	0.8	.....	40–44	0.1	0.9	6.4	3.8
145–149	6.7	4.0	3.2	.....	35–39	0.1	0.6	0.8	1.0
140–144	6.8	4.0	0.8	2.9	30–34	.....	0.7	1.6	2.9
135–139	5.5	4.4	1.6	1.0	25–29	0.1	0.5	3.2	1.0
130–134	7.1	5.3	.....	1.9	20–24	.....	0.3	.....	1.0
125–129	6.3	4.9	2.4	1.0	15–19	.....	0.4	2.4	3.8
120–124	6.4	5.0	4.8	1.0	10–14	.....	0.1	1.6	3.8
115–119	4.5	6.1	3.2	5.8	5– 9	.....	0.2	.....	.....
110–114	4.3	6.2	6.4	2.9	0– 4	.....	0.04	.....	.....
105–109	4.0	5.7	1.6	2.9					
100–104	3.8	5.6	4.8	1.9	Number of cases	1,275	2,437	125	104
95– 99	2.5	5.5	5.6	3.8	Median score	137.1	110.7	82.9	75.0
90– 94	1.9	4.3	4.0	1.9					

TABLE 322.—*Per cent distribution of alpha scores of various groups, based on schooling level of 4 years of college.*

Alpha score.	Officers.	White draft, native born.	Alpha score.	Officers.	White draft, native born.
205–212	0.2	.....	90–94	1.6	2.4
200–204	0.4	0.3	85–89	1.4	1.4
195–199	1.4	0.7	80–84	1.1	1.6
190–194	1.7	0.7	75–79	0.8	0.8
185–189	2.8	2.4	70–74	0.3	0.6
180–184	3.6	2.7	65–69	0.6	1.8
175–179	4.1	3.3	60–64	0.4	0.3
170–174	5.8	5.1	55–59	0.3	0.3
165–169	5.4	5.4	50–54	0.4	0.4
160–164	6.2	6.2	45–49	0.2	0.4
155–159	6.8	5.5	40–44	0.05	.....
150–154	6.4	6.6	35–39	0.1	0.1
145–149	5.8	7.5	30–34	0.1	0.3
140–144	6.1	5.8	25–29	0.03	0.3
135–139	5.7	4.1	20–24	.....	0.1
130–134	5.6	4.1	15–19	0.03	.....
125–129	4.6	4.9	10–14	.....	0.1
120–124	4.8	4.8	5– 9	.....	.....
115–119	4.1	5.9	0– 4	.....	.....
110–114	3.3	4.0			
105–109	3.4	3.0	Number of cases	3,954	708
100–104	2.4	2.4	Median score	145.4	141.8
95– 99	2.2	3.7			

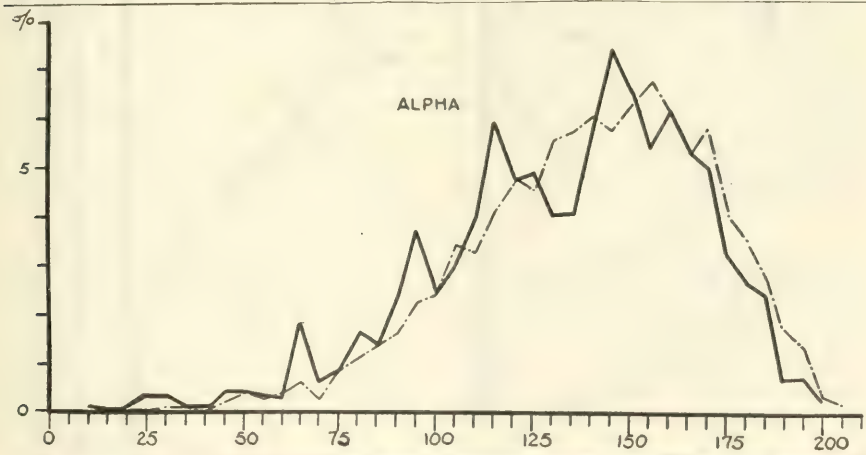
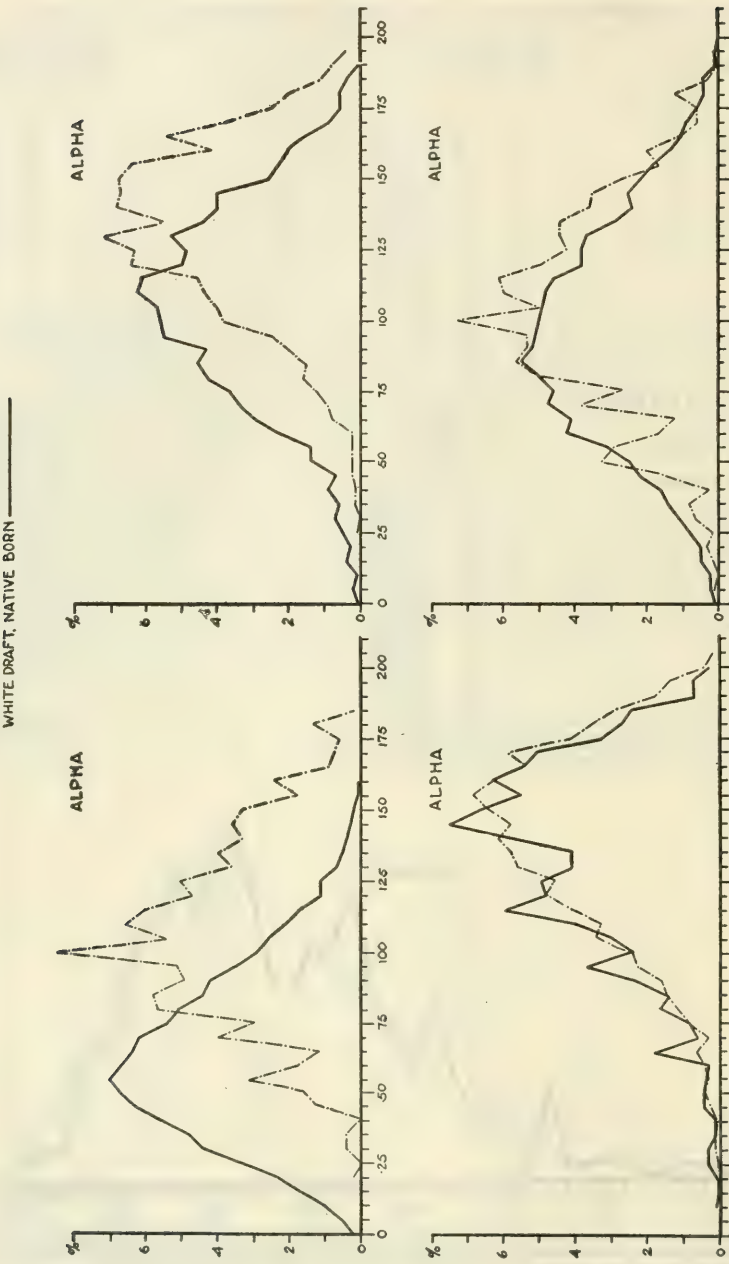


FIG. 45. Distribution of alpha scores. These groups contain only those who reported that they were in the fourth year of college when they left school. The comparison is then between the intelligence scores of officers and white (native born) recruits who had had equal school opportunities, i. e., four years of college. (The other recruit groups reporting fourth year college were so small as to be negligible.)



FIGS. 46, 47, 48, and 49. Distribution of alpha scores. The curves of figures 46, 47, and 48 are isolated from preceding graphs in order to show differences of intelligence between officers and native-born white draft at different levels of schooling. Figure 46 is for eighth-grade maximal schooling (both officers and men); figure 47 is for fourth year high school; figure 48 is for fourth year college. Figure 49 compares intelligence of officer of eighth-grade schooling and *less* with the intelligence of native-born white recruits of ninth-grade schooling and *more*. Although these two groups overlap in schooling not at all, the officers nevertheless make slightly higher scores on examination alpha.

TABLE 323.—*Per cent distribution of alpha scores of officers. Comparison of officers with schooling only to eighth grade or less with recruits of more than eighth-grade schooling.*

Alpha score.	Officers.	White draft, native born.	Alpha score.	Officers.	White draft, native born.
205–212		0.01	90–94	5.3	5.2
200–204		0.02	85–89	5.6	5.5
195–199	0.15	0.1	80–84	5.0	5.0
190–194		0.1	75–79	2.7	4.6
185–189	0.3	0.4	70–74	3.8	4.7
180–184	1.2	0.4	65–69	1.2	4.1
175–179	0.6	0.6	60–64	1.7	4.2
170–174	0.6	0.9	55–59	2.9	3.1
165–169	1.1	1.1	50–54	3.2	2.5
160–164	2.0	1.4	45–49	1.4	2.2
155–159	1.7	1.8	40–44	0.3	1.6
150–154	2.7	2.2	35–39	0.8	1.4
145–149	3.5	2.5	30–34	0.6	1.1
140–144	3.6	2.4	25–29	0.15	0.8
135–139	4.4	2.9	20–24	0.3	0.5
130–134	4.4	3.7	15–19	0.15	0.5
125–129	4.2	3.8	10–14		0.2
120–124	4.9	3.8	5–9	0.15	0.2
115–119	6.1	4.6	0–4		0.06
110–114	5.9	4.8			
105–109	5.0	4.9	Number of cases	660	13,943
100–104	7.3	5.0	Median score	107.3	97.4
95–99	5.3	5.1			

That education is certainly not the chief conditioning factor in scores on examination alpha is very well shown in table 323 and figure 49. Here the alpha scores of native-born white recruits of high school and college education are compared with those of officers of eighth grade schooling or less. Every recruit in the recruit group has had more schooling than any officer in the officer group; the least educated recruit in the group has had a longer education than the best educated officer included. And the group of officers nevertheless makes a slightly better record on examination alpha. It is evident then that the examination is measuring other qualities, in which officers stand above recruits, to a greater extent than it is measuring education.

SECTION 4.—*Correlations between schooling and intelligence ratings.*

In view of the close relationship between education and intelligence ratings which have appeared in the preceding sections, it is not surprising that the computed coefficients of correlation (Pearson r) run high. In general it may be said of examination alpha that in an unselected group (i. e., *including* those men who would ordinarily be considered too illiterate to take alpha) the correlation with the number of years schooling reported approximates +0.75; in an alpha group (i. e., *excluding* illiterates) the correlation coefficient approximates +0.65. If alpha were to be given to an unselected group the dispersion of whose scores covered the whole range of the examination, and whose reported schooling varied from none at all to seven years or more of college work, the correlation coefficient would doubtless be greater than any here presented. The nearest approach to this is a combination of two of the groups which appear in table 324 (the Hancock group of 489 and the unselected group from nine camps, Group X); this gives a wide range both of schooling and of alpha scores and a correlation coefficient of +0.81 between reported schooling and alpha weighted total.

Except for the principal Hollerith sample (Groups I, II, III), table 324 is compiled from camp reports and from data already at hand before the principal Hollerith samplings were made. The most heterogenous single group included (the unselected group of 653 men from nine camps, Group X) contains no weighted alpha score higher than 360 and no schooling record of more than four years college, thus not covering the upper part of the range in either respect. For this group the correlation is 0.75, whether raw or weighted totals are considered. The same relation is found for the unselected group from the Three hundred and fourth Ammunition Train, Camp Meade, in which the range of scores and schooling is about the same as for the unselected group of 653.

TABLE 324.—*Correlations between examination alpha and reported schooling.*

Camp.	Group.	Range.	Number of cases.	r
Cody (alpha group)	Oklahoma recruits, October Casual Camp.	Grade IV to college 4; alpha raw, 0 to 170.	506	0.67
Do	Minnesota recruits, October Casual Camp.	Grade IV to college 4; alpha raw, 0 to 185.	707	.65
Do	Recruits from Colorado, New Mexico, Oklahoma, and Texas.	Grade I to high school 4; alpha weighted, 0 to 330.	3,946	.60
Hancock (alpha group)	Companies A and B, Third Provisional Regiment Ordnance Training Camp.	Grade IV to college 4; alpha weighted, 0 to 380.	252	.67
Do	Company B, Ordnance Supply School.	High school 1 to college 7; alpha weighted, 100–380.	237	.26
Hancock (alpha group, two previous groups combined).	Company B, Ordnance Supply School, and Companies A and B, Third Provisional Regiment, Ordnance Training Camp.	Grade IV to college 7; alpha weighted, 0 to 380.	489	.73
Sixteen camps (alpha group)	Principal Hollerith sample, Groups I, II, and III, native born.	None to college 8; alpha raw, 0 to 205.	51,620	.65
Do	Same, foreign	None to college 6; alpha raw, 0 to 205.	4,162	.53
Do	Same, northern negroes	None to college 6; alpha raw, 0 to 185.	2,850	.59
Do	Same, southern negroes	None to college 4; alpha raw, 0 to 105.	1,709	.59
Do	Same, officers	Grade VIII to college 12; alpha raw, 0 to 205.	12,586	.25
Meade (unselected)	Three hundred and fourth Ammunition Train, native-born and foreign men.	None to college 4; alpha, 0 to 350	262	.75
Nine camps (unselected)	Draft groups, native-born sample, Group X.	None to college, 4; alpha, 0 to 360	653	.75

The term "alpha group" in this table indicates, as has been said, that the men considered too illiterate to take alpha had already been eliminated (Cody, basis fourth grade school; Hancock, basis ability to read and write fairly, or sixth grade schooling). From the Meade group termed "unselected," no elimination at all had been made; from the unselected group of 653, men of foreign birth had been eliminated.

It is obvious in looking over these correlations that they vary chiefly with the heterogeneity of the group—the range both of schooling and of alpha scores which is involved. It is for this reason that the coefficient for officer groups is always small.

The correlation plots of the Hollerith samplings appear in tables 281 to 287; that of the unselected group of 653 men from nine camps in table 325. It will be noted that of the men who fall below the average score in examination alpha (raw 60–64, weighted 120–129 score groups) very few go to college, less than 1 per cent of those below average in the white draft groups (i. e., less than one-half per cent of the total number) and about 1½ per cent of those below average (i. e., three-fourths of 1 per cent of the total number) in the negro draft groups. This fact appears clearly in the plot for the unselected group of 653, where only a single individual (a dental student) of the 348 men who fall below the average alpha score has ever been to college; the same is true without exception of the Hancock group. Moreover, of this 348 who fall below the average alpha score, only 4 were graduated from high school; only 10 others ever attended high school. The theory that native intelligence is one of the most important conditioning factors in continuance in school is certainly borne out by this accumulation of data.

TABLE 325.—*Correlation between alpha raw total and reported schooling. Group X: Native-born draft, nine camps.*

Alpha raw total score.	Years schooling.																	Total.
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
180																2	1	3
170															1			1
160								1					3	1		1	1	7
150												2	2				1	5
140								1	1	1	2	2	1		2	1	1	12
130							1		1	2	4	2	3	1	1		2	17
120									5	5	3	3	1	2	1	1		21
110								2	7	1	4	3	4					21
100							2	2	5	2	3	2	3	2	1			22
90						1	1	3	11	7	4	8	4	5				39
80						1	3	5	25	7	7	1	1	2	1			53
70						2	5	9	11	4	1	2	1	1	1	1		38
60					4	2	3	12	15	6	5	4		2				53
50					2	8	6	6	11	2	1	1	1					38
40					2	9	7	14	18	1	1	1						53
30				3	12	8	11	9	21	2			2					68
20				5	11	15	7	8	11		1		1		1			60
10–19	1	2	3	6	18	15	6	2	6			1						60
0–9	14	15	4	15	14	16	2	2										82
Total	15	17	7	29	63	77	54	76	148	40	36	27	27	16	9	6	6	653

$r = +0.75$

Correlation of each of the eight alpha tests with reported schooling has been made in two of the groups in table 326, the combined Hancock alpha group, and the unselected English-speaking group of 653 (Group X). The coefficients are as follows:

TABLE 326.—*Correlations between alpha tests and schooling.*

Test.	Name of test.	Hancock.	Group X.
1	Oral directions	0.59	0.62
2	Arithmetic	.57	.74
3	Common sense	.51	.66
4	Opposites	.68	.65
5	Disarranged sentences	.66	.63
6	Number series	.52	.62
7	Analogies	.66	.60
8	Information	.63	.70

Inspection of the scatter diagrams shows that the discrepancies between these two sets of figures are due chiefly to the inclusion in the unselected group of 653 of a number of illiterate men. The extreme skewness due to the large number of low scores on tests 4, 5, and 7 tends to lower the correlation coefficients on these tests in the unselected group, while in tests 1 and 8 the unusual number of low scores makes the distributions more nearly normal, and thus helps to raise the correlation coefficients. The differences in tests 3 and 6, and especially in test 2, have not been explained.

Most correlations of beta and individual examinations with schooling are of an entirely different significance than those of alpha, because the groups are so selected that the schooling is restricted. Schooling (4, 5, or 6 years) is indeed frequently the sole basis of the separation into alpha and beta groups. Intelligence scores are low in these groups for the most part, and under these limitations the correlation coefficient is bound to be low. This relation holds for the correlations of the principal samplings shown in table 327. These coefficients should be compared with the figures for the unselected group from Camp Meade (includes foreigners) and for Group X (excludes foreigners), which conclude the table. The correlation plot for Group X (beta raw total with years schooling) is shown in table 328.

TABLE 327.—*Correlations between examination beta and schooling.*

Camp.	Group.	Range.	Number of cases.	r
Sixteen camps (beta group)	Principal Hollerith sample, native born.	None to college 4; beta raw, 0 to 115	11,879	0.45
Do	Principal Hollerith sample, foreign	None to college 2; beta raw, 0 to 105	5,803	.50
Do	Principal Hollerith sample, northern negroes.	None to high school 4; beta raw, 0 to 90.	1,737	.36
Do	Principal Hollerith sample, southern negroes.	None to high school 4; beta raw, 0 to 100.	3,438	.55
Meade (unselected)	Three hundred and fourth ammunition train (includes foreign).	None to college 4; beta weighted, 0 to 200.	262	.66
Nine camps (unselected), Group X.	Draft group (excludes foreign)	None to college 4; beta weighted, 0 to 210.	653	.64
Do	do	None to college 4; beta raw, 0 to 110.	653	.67

A report from Camp Lee on the results of giving examination beta to school children of Petersburg, Va., gives the median scores of table 329 for each of the beta tests and for the weighted total.

TABLE 328.—*Correlation between beta raw total and reported schooling. Group X: Native-born draft, nine camps.*

Beta raw total score.	Years schooling.																	Total.
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
110								1			1	1	1		1	1		6
105										1	1		3				2	7
100						1			3	3	2	1	2	5		1	2	20
95								5	7	4	3	4	2		1	1	1	28
90							1	2	10	3	3	4	5	1	1	1	1	32
85					1	3		6	10	9	7	4	3	4	1			48
80						3	4	13	14	2	6	2	4	4	2	2		56
75					4	4	4	11	15	2	6	5		1	2			54
70				1	1	7	7	7	15	6	2							46
65					4	3	3	4	14	3		4		1				36
60				2	4	7	4	6	16	3	2		1					45
55				1	3	6	5	5	9	2			1					32
50				2	6	6	5	3	14			1	1					38
45	1	1		1	4	8	3	3	4	1			1					27
40	1	3		3	7	5	5	4	5		3		1					37
35		1	1	3	7	7	7	1	4				1					32
30				3	6	3	2	1	2				1					18
25	1	2	3	1	8	6	1		3	1					1			27
20	4	3	1	5	4	2	1	2	1									23
15	1	1	1	4	2	1	1	1				1						13
10	3	2			2	5		1	2									15
5–9	2	3		2			1											8
0–4	2	1	1	1														5
Total	15	17	7	29	63	77	54	76	148	40	36	27	27	16	9	6	6	653

$r = +0.67$

TABLE 329.—*Medians on beta tests, Jackson School, Petersburg, Va.*

Test.	Grade.					
	1	2	3	4	5	6
Median age	7.6	8.9	10.1	11.1	12.5	14.1
Test 1	0.3	0.5	1.0	3.0	5.1	4.3
Test 2	1.0	1.4	1.5	2.3	4.1	3.4
Test 3	0.4	2.0	5.6	6.7	8.5	8.4
Test 4	1.3	4.8	9.5	12.2	14.7	17.7
Test 5	0.8	1.9	11.2	13.9	15.9	18.2
Test 6	2.8	6.3	9.0	9.7	12.9	13.0
Test 7	0.2	0.2	0.7	3.0	5.2	5.3
Test 8	1.0	4.9	6.7	7.6	9.7	9.7
Total weighted	16	42	73	95	130	135

The only one of the individual examinations for which schooling correlation has been determined in an unselected group is the Stanford-Binet examination. This determination was made for Group X, the experimental group of 653 recruits from nine camps, and the result is shown in table 330.

TABLE 330.—*Correlation between Stanford-Binet mental age and reported schooling. Group X: Native-born draft, nine camps.*

Stanford-Binet mental age.	Years schooling.																	Total.
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
19 6/12										1	1		1				1	4
19									1									1
18 6/12								3	2		1	3		2		2	1	14
18					1		1	1	3	1	4	1	2		2	1	3	20
17 6/12									7	1	4		4	1		1	1	19
17						1		2	4	2	7	4	2	4	2			28
16 6/12						1	1	3	12	4	1	2	7					31
16		1				1	2	3	5	2	1	1	3	1	3			23
15 6/12						1		6	10	6	3	1		3	1			31
15					2	3	3	7	8	1	1	4	2	1				32
14 6/12		1			1	5	3	7	10	5		3	2	1		1		39
14					4	1		3	17	5	5	3						38
13 6/12				1	3	4	2	5	6	4	4			2				31
13				1	5	3	5	5	13	3	1	2						38
12 6/12				1	2	7	6	8	11	1		1						37
12	2		1	1	5	10	5	4	10	1	2		1	1		1		44
11 6/12	1	2		3	4	6	8	1	11	1		1			1			39
11				1	4	3	7	5	7	1			2					30
10 6/12			1	4	7	7	4	5	2		1							31
10	2	2	1	5	5	7	2	3	7	1								35
9 6/12	2	2	1	4	9	11	3	1	1			1	1					36
9		4		4	9	3	2	3	1									26
8 6/12	3	1		2	1	2		1										10
8	3	4	2	1	1	1												12
7 6/12																		0
7			1															1
6 6/12	1			1														2
6																		0
5 6/12	1																	1
Total	15	17	7	29	63	77	54	76	148	40	36	27	27	16	9	6	6	653

$r = +0.65$

Probably the best measure of intelligence which the Army tests have yielded is a combination of the standing on alpha, beta, and individual examinations.[1] This, though not practicable for actual use, was computed for the experimental group of 653 men from nine camps. The schooling reported by this group was plotted against this combined standing with the result shown in table 331.

TABLE 331.—*Relation of schooling to intelligence.*

Combined standing on alpha, beta and Stanford scales.	Years schooling.																	Total.
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
+660 to +699																1	1	2
+620 to +659													1			1		2
+680													1		1			2
+540								1				2	1	1	1	1	3	10
+500									1		2	1				1	1	6
+460								1		1	1		4	1			1	9
+420									2	1	4	4	1	1				13
+380							1	2	5	4	4		1	2	2			21
+340								1	4	2	3	1	3	1	1			16
+300						1		1	7	2	1	2	5	1				20
+260								1	10	2	3	4	3		1	1		25
+220							3	4	7	7	5	1	1	3	1			32
+180						2	1	8	6	6	1	3	1	3	1			32
+140						2	2	4	8	2	4	2		1				25
+100					4	2	1	6	13	2	2	3		1				34
+60					2	1	1	8	15	4	2	1	1	1				36
+20						4	1	4	9	2	1					1		22
−20 to +19				1	2	1	6	7	16	1	1	1						36
−60					2	6	4	4	7			1						24
−100		1			2	6	7	9	10	1	1							37
−140					4	7	2	1	7	2								23
−180				1	6	5	10	2	5	1								30
−220				5	6	8	3	3	4				3					32
−260		1	1	2	5	9	2	1	6		1		1					29
−300	1	2		2	6	4	5	3	1						1			25
−340		2		2	7	8	4	1	2									26
−380	2	1	2	4	8	3		1	1									22
−420	4	1	1	6	5	5	1	2	2			1						28
−460	1	4	1	2	3	1		1										13
−500	3	3		1	1	1												9
−540	1		1	2		1												5
−580	1	2	1															4
−620 to −581	1			1														2
−660 to −621	1																	1
Total	15	17	7	29	63	77	54	76	148	40	36	27	27	16	9	6	6	653

$r = +0.75$

It is again evident here that though an intelligent man may drop out of school at almost any stage beyond grade 4 an unintelligent man is most unlikely to remain in school beyond the eighth grade. Distinctly more than average intelligence would seem to be a prerequisite to a college education and almost as strictly a prerequisite to graduating from or even entering high school.

[1] For description of method used in combining these scores see R. S. Woodworth, A Study of Statistical Method, Psych. Rev., vol. 19, 1912, pp. 99ff.

CHAPTER 11.

INTELLIGENCE OF THE DRAFT IN RELATION TO FITNESS FOR MILITARY SERVICE.

SECTION 1.—*Intelligence of the draft.*

The psychological examiner is frequently asked this question: "How intelligent is the Army?" There is an inherent difficulty in making an answer, for there are no standards in terms of which the statement can be made. The most familiar measures of intelligence, years of mental age as determined by the Stanford-Binet examination, are the results of investigations of a much smaller group (approximately 1,000 cases) than the group studied in the Army. For norms of adult intelligence the results of the Army examinations are undoubtedly the most representative. It is customary to say that the mental age of the average adult is about 16 years. This figure is based, however, upon examinations of only 62 persons; 32 of them high-school pupils from 16 to 20 years of age, and 30 of them "business men of moderate success and of very limited educational advantages." [1] This group is too small to give very reliable results and is furthermore probably not typical. High-school pupils and business men of moderate success presumably do not represent the average American adult with respect to intelligence. (See Chapter 10, table 330, in which 85 per cent of the men who had been to high school show mental ages above average.)

It appears that the intelligence of the principal sample of the white draft, when transmuted from alpha and beta examinations into terms of mental age, is about 13 years (13.08). Here we have a measure of the average intelligence of nearly 100,000 white recruits. We can hardly say, however, with assurance that these recruits are three years mental age below the average. Indeed, it might be argued on extrinsic grounds that the draft itself is more representative of the average intelligence of the country than is a group of high school students and business men. The draft, it is true, is highly selected at the upper end by reason of the fact that men of higher intelligence became officers without being drafted or constituted the greater part of the group of professional and business experts that were exempted from draft because essential to industrial activity in the war. It is impossible to guess the extent of this selection with respect to intelligence. It seems quite impossible that it could have reduced the intelligence level of the draft so much as three years. Considerably less than 15 per cent of the draft (cf. table 333) lie above 16 years mental age. This discrepancy would mean that a very large number of men in proportion to the draft (considerably more than one man to every three of the draft, perhaps even so great a proportion as two to every three) would have been exempted because of service as an officer or because in some essential industrial occupation. No positive figures of the number of men exempted for these reasons are at present available, but there seems to be no doubt that it was considerably smaller than these indicated proportions. Undoubtedly the intelligence of the draft is somewhat lower than that of the country at large, although it is quite unlikely that the difference should be so great. It must be recalled further that there was also selection at the lower end of the scale on intelligence. The low-grade feeble-minded were not in general included in the draft. This selection tends to offset the selection at the upper end, although presumably it does not completely counterbalance it, and thus to render the average intelligence of the draft more nearly representative of the population at large than would otherwise be the case.

In general, then, we are forced to reply to the question "How intelligent is the Army?" by stating arbitrary figures that refer to the draft itself, and by arguing further that the draft is approximately a representative group which is presumably, however, a little lower in intelligence than is the country at large.

[1] See Terman, L. M., et al, The Stanford Revision and Extension of the Binet-Simon Scale for Measuring Intelligence, 1917, p. 49.

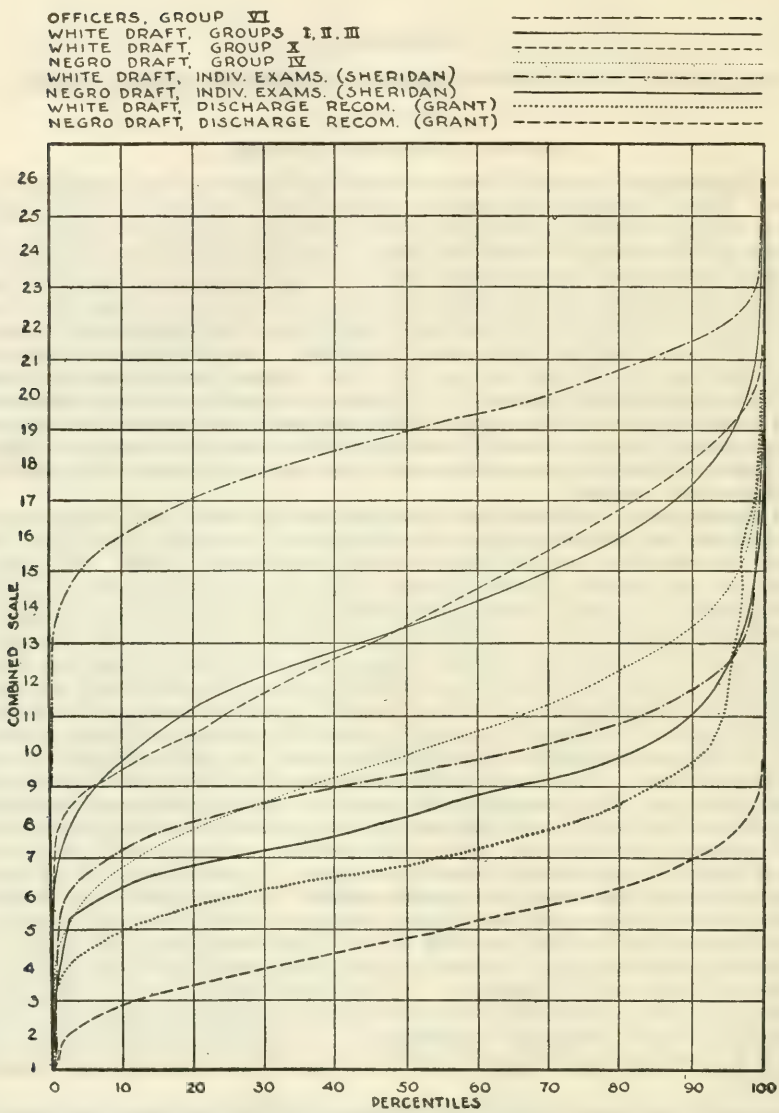


FIG. 50. Percentile curves of intelligence scores. Comparison of intelligence of officer and draft groups as distributed on a combined scale. Alpha, beta, and individual examination records could thus be thrown together to give a complete picture of each group. (Scores on combined scale along vertical axis are to be interpreted as "under 1," "under 2," etc.)

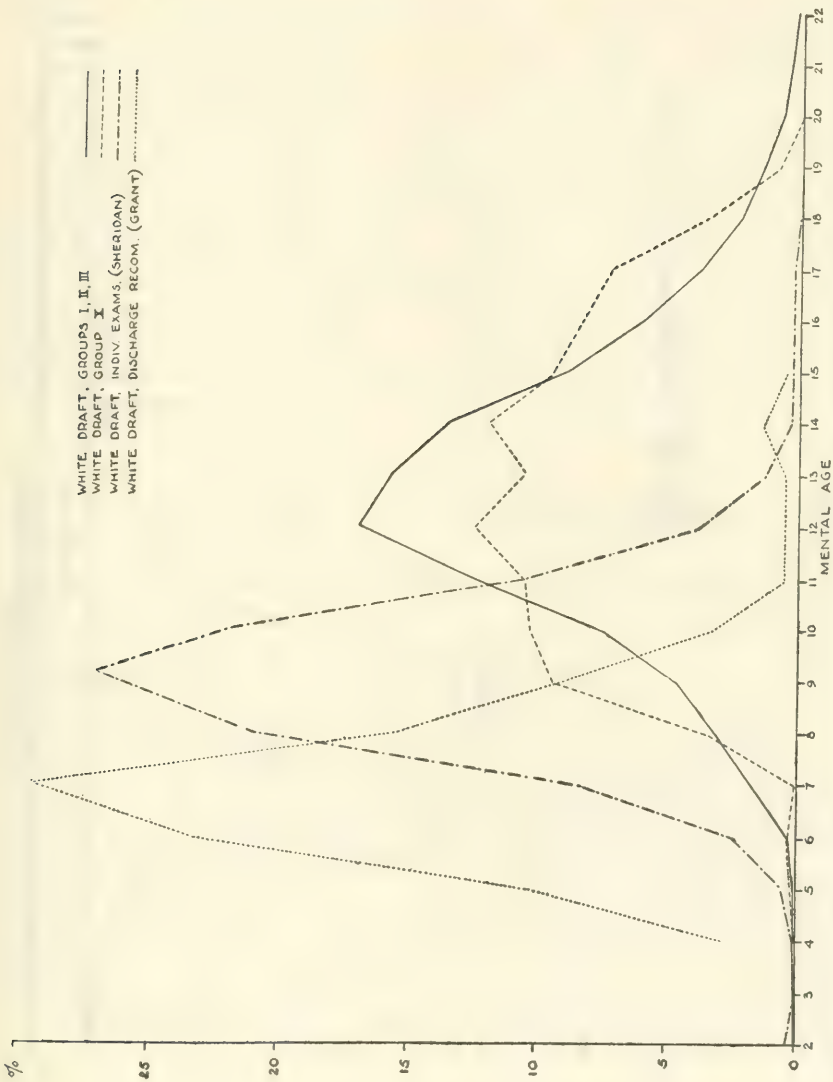


FIG. 51. Per cent distributions of mental age. White recruits who failed on group examinations, and white recruits recommended for discharge, are here compared with total white draft (Groups I, II, and III).

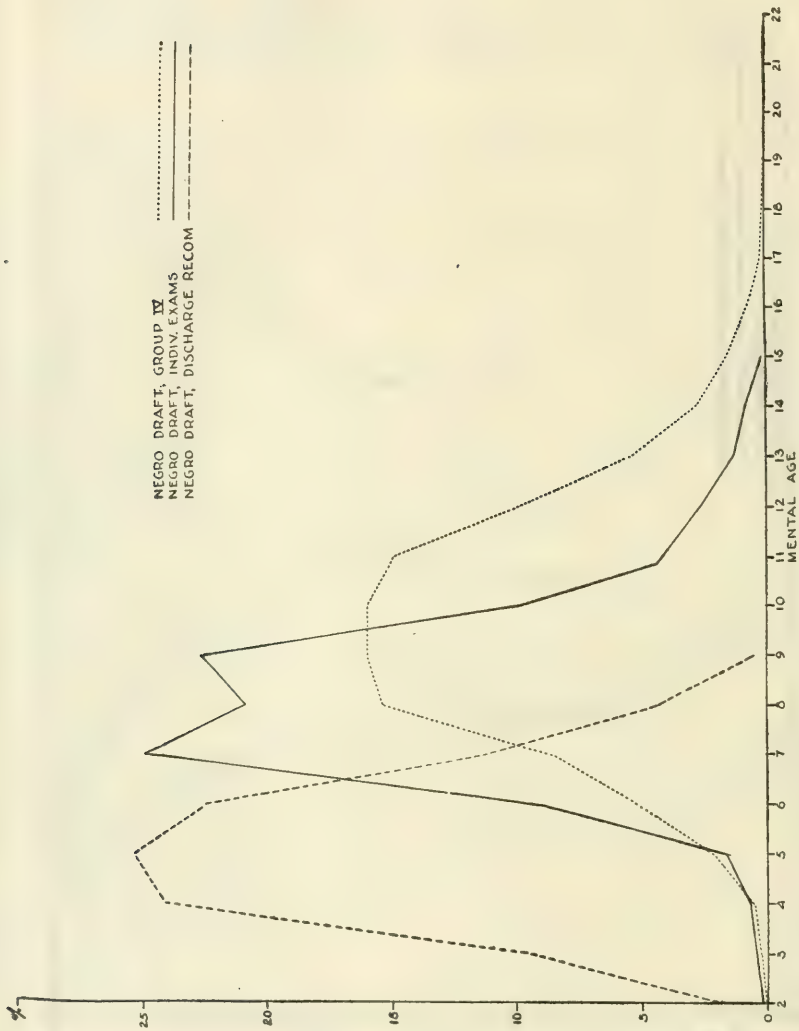


FIG. 52. Per cent distributions of mental age. Negro recruits who failed on group examinations, and negro recruits recommended for discharge, are here compared with total negro draft (Group IV.)

The intelligence of the draft in terms of the theoretical combined scale derived in chapter 2 is shown in table 165. These figures transformed into percentiles are given herewith in table 332 and graphically in figure 50. The values of the class intervals of the combined scale have been transmuted into terms of mental age in table 333 and figures 51 and 52. This transmutation was made, not by the regression equation, but by equating the means of the experimental group in terms of combined scale and of mental age and multiplying deviations from the mean of the combined scale by the ratio of the two standard deviations. These tables and graphs include also, for purposes of comparison, the negro draft, white officers, and groups of men examined individually. The transmutation into mental age is given because those terms have now acquired some absolute meaning and are therefore familiar. Rejections from the Army as well as special treatment of the feeble-minded in civil life can be thought of best in relation to units of mental age. On the other hand, as we have just seen, it may be necessary to revise our notion of the frequency of occurrence of these various levels of intelligence. We know now approximately from clinical experience the capacity and mental ability of a man of 13 years mental age. We have never heretofore supposed that the mental ability of this man was the average of the country or anywhere near it. A moron has been defined as anyone with a mental age from 7 to 12 years. If this definition is interpreted as meaning anyone with a mental age less than 13 years, as has recently been done, then almost half of the white draft (47.3 per cent) would have been morons. Thus it appears that feeble-mindedness, as at present defined, is of much greater frequency of occurrence than had been originally supposed.

TABLE 332.—*Per cent distribution on combined scale of officer and draft groups.*

Combined scale.	Officers, Group VI.		White draft, Groups I, II, and III.		White draft, Group X.		Negro draft, Group IV.		White individual examination (Sheridan).		Negro individual examination (Sheridan).		White discharge (Grant).		Negro discharge (Grant).	
	Distribution.	Sum.	Distribution.	Sum.	Distribution.	Sum.	Distribution.	Sum.	Distribution.	Sum.	Distribution.	Sum.	Distribution.	Sum.	Distribution.	Sum.
25-25.9	0.01	100.0	0.00	99.9												
24-24.9	0.04	100.0	0.01	99.9												
23-23.9	0.68	99.9	0.02	99.9												
22-22.9	3.94	99.3	0.13	99.8												
21-21.9	10.60	95.3	0.47	99.7	0.1	100.0	0.01	100.0								
20-20.9	16.22	84.7	1.06	99.3	1.0	99.9	0.04	100.0								
19-19.9	18.24	68.5	1.90	98.2	3.0	98.9	0.09	100.0					0.4	100.0		
18-18.9	17.36	50.3	3.14	96.3	6.4	95.9	0.27	99.9	0.3	100.0			0.3	99.6		
17-17.9	13.86	32.9	4.88	93.2	7.0	89.5	0.48	99.7	0.3	99.7			0.6	99.3		
16-16.9	9.35	19.0	7.06	88.3	8.5	82.5	0.96	99.2	0.4	99.4	0.3	100.0	1.1	98.7		
15-15.9	5.38	9.7	9.63	81.2	9.3	74.0	1.76	98.2	0.1	99.0	0.5	99.7	0.6	97.6		
14-14.9	2.65	4.3	12.23	71.6	9.7	64.7	3.32	96.5	0.7	98.9	1.0	99.2	0.2	97.0		
13-13.9	1.15	1.6	15.14	59.4	10.0	55.0	5.99	93.2	1.2	98.2	1.2	98.2	0.6	96.8		
12-12.9	0.39	0.5	14.83	44.2	11.3	45.0	9.40	87.2	4.2	97.0	2.6	97.0	0.8	96.2		
11-11.9	0.09	0.1	10.68	29.4	9.2	33.7	12.08	77.8	9.9	92.8	3.9	94.4	0.6	95.4		
10-10.9	0.02	0.0	7.32	18.7	10.0	24.5	14.09	65.7	18.9	82.9	8.3	90.3	2.8	94.8		
9-9.9	0.01	0.0	5.08	11.4	8.1	14.5	15.36	51.6	23.2	64.0	17.0	82.0	7.5	92.0	0.4	100.0
8-8.9			3.14	6.3	5.0	6.4	13.68	36.2	21.8	40.8	19.0	65.0	11.5	84.5	2.6	99.6
7-7.9			1.79	3.2	0.9	1.4	10.34	22.6	10.6	19.0	31.0	46.0	18.2	73.0	6.8	97.0
6-6.9			0.86	1.4	0.3	0.5	6.44	12.2	5.6	8.4	6.0	15.0	27.3	54.8	13.2	90.2
5-5.9			0.35	0.5	0.2	0.2	3.42	5.8	1.8	2.8	6.7	9.0	16.5	27.5	24.0	77.0
4-4.9			0.13	0.2			1.54	2.4	0.3	1.0	0.9	2.3	8.2	11.0	23.0	56.0
3-3.9			0.04	0.1			0.58	0.8	0.3	0.7	0.5	1.4	2.2	2.8	21.2	33.0
2-2.9			0.01	0.0			0.21	0.2	0.2	0.4	0.8	0.9	0.5	0.6	9.2	11.8
1-1.9							0.04	0.1	0.2	0.2	0.1	0.1	0.1	0.1	2.6	2.6
0-0.9							0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Number of cases	15,544		93,955		653		18,891		690		514		141		158	
Median score	18.84		13.46		13.5		9.98		9.4		8.25		6.8		4.75	

TABLE 333.—*Percentage comparison of mental age of groups from the draft.*

Mental age.	White draft, Groups I, II, and III.		White draft, Group X.		Negro draft, Group IV.		Sheridan, white individual examination.		Sheridan, negro individual examination.		Grant, white discharge.		Grant, negro discharge.	
	Distribution.	Sum.	Distribution.	Sum.	Distribution.	Sum.	Distribution.	Sum.	Distribution.	Sum.	Distribution.	Sum.	Distribution.	Sum.
22-22.9	0.05	100.0												
21-21.9	.07	99.9												
20-20.9	.08	99.9			0.01	100.0								
19-19.9	1.5	99.8	0.9	100.0	.04	100.0								
18-18.9	2.3	98.3	3.7	99.1	.10	100.0	0.1	100.0						
17-17.9	3.9	96.0	7.3	95.4	.27	99.9	.3	100.0						
16-16.9	6.1	92.1	8.4	88.1	.79	99.7	.3	99.7			0.7	99.8		
15-15.9	9.3	86.0	9.8	79.7	1.7	98.9	.3	99.4	0.2	99.8	0.7	99.1		
14-14.9	13.6	76.7	12.0	69.9	2.8	97.2	.4	99.1	.8	99.6	1.4	98.4		
13-13.9	15.8	63.1	10.7	57.9	5.4	94.4	1.3	98.7	1.4	98.8	0.7	97.0		
12-12.9	17.0	47.3	12.6	47.2	10.0	89.0	3.8	97.4	2.7	97.4	0.7	96.3		
11-11.9	12.7	30.3	10.7	34.6	15.0	79.0	10.7	93.6	4.3	94.7	0.7	95.6		
10-10.9	7.6	17.6	10.4	23.9	16.0	64.0	21.9	82.9	9.9	90.4	3.5	94.9		
9-9.9	4.7	10.0	9.5	13.5	16.0	48.0	27.0	61.0	22.7	80.5	9.2	91.4	0.6	100.0
8-8.9	3.15	5.3	3.4	4.0	15.3	32.0	21.2	34.0	20.8	57.8	15.6	82.2	4.4	99.4
7-7.9	1.75	2.1	.1	.6	8.5	16.7	8.3	12.8	24.9	37.0	29.1	66.6	11.4	95.0
6-6.9	.20	.4	.3	.6	5.2	8.2	3.5	4.5	9.3	12.1	23.4	37.5	22.8	83.6
5-5.9	.10	.2	.2	.2	2.1	3.0	.6	1.0	1.6	2.8	11.3	14.1	25.3	60.8
4-4.9	.04	.1			.55	.8	.1	.4	.6	1.2	2.8	2.8	24.1	35.5
3-3.9	.05	.1			.26	.3		.3	.4	.6			9.5	11.4
2-2.9	.01	.0			.04	.0	.3	.3	.2	.2			1.9	1.9
1-1.9														
Number of cases	93,955		653		18,891		690		514		141		158	
Median mental age	13.15		13.25		10.1		9.6		8.6		7.4		5.6	

Since grade of intelligence furnished a basis for rejection, discharge, or assignment to special organizations, such as labor battalions or development battalions, it was necessary in the psychological service to make some practical decision as to the various levels at which recommendation for such disposition should be made. No suggestion could be made until the actual operation of psychological examining in the camps had been established. In the very first period of examining there was no official rule; later it was suggested that men whose mental age was less than 10 years could not be utilized to advantage in the Army, for at that time the development battalions and labor battalions did not exist and the only alternative to regular service was discharge. It was soon found, however, that the 10-year standard was too high, less presumably because of the fitness of men just under 10 years mental age for regular service than because of the fact that an impracticably large number would have been discharged on this basis (from 10 to 13 per cent; cf. table 333). At Camp Devens nine years was adopted as a working basis and later, with the establishment of labor battalions and development battalions, the following rule was laid down:

> In general, subjects whose mental age is below eight should be seriously considered for discharge or development battalion. Those whose mental ages range from eight to ten should be considered for use in special service organizations or for assignment to development battalions.

The question of different standards for negroes was raised (half of the negro draft was rated by the examination system as below 10 years mental age, table 333) but never answered. The camps were in general obliged to determine their own procedure in accordance with local conditions.

Table 333 and figure 51 give the best summary of the intelligence of the draft that is available. It will be noted that there are two sets of figures; one a set derived from Groups I, II, and III, of the principal sample as laid down on the combined scale, and the other the actual percentages obtained in the Stanford-Binet examinations of the 653 native-born white recruits of Group X. The former group is large and representative but involves an error dependent on the fact that these men were examined by alpha and beta and not by a mental-age scale. The second group suffers from the fact that it is small and can not be demonstrated to be representative. If the two distributions are taken together the results can undoubtedly be considered accurate within the limits of discrepancy between them. It will be seen that a level of eight

years mental age for rejection would mean the elimination of from one-half to 2 per cent of white recruits and approximately 17 per cent of negro recruits. Placing the level at nine years would eliminate 4 or 5 per cent of whites and presumably 32 per cent of negroes. A 10-year limit rejects from 10 to 13 per cent of white and 48 per cent of negro recruits. It would be totally impossible to exclude all morons as that term is at present defined, for there are under 13 years 47 per cent of whites and 89 per cent of negroes.

Several studies of the groups of men who were individually examined or who were recommended for discharge throw light on the social value of men unable to pass the group examinations. Summaries of two such studies follow in sections 2 and 3.

SECTION 2.—*Characteristics of men recalled for individual examination.*

Men who are recalled for individual examination in camp are those who have failed to pass a group examination. They may fail because of defective intelligence or because of some social maladjustment that renders them unable or unwilling to cooperate in the group examination. Although no stricter definition can be laid down, they do in general constitute a "low-grade" group, a large proportion of which requires special treatment or assignment in the military machine. A qualitative study of such a group is therefore of interest.

For this purpose there are available records of a group of men, both white and colored, who were examined at Camp Sheridan, Ala., between May and December, 1918. These records are unusually complete. Almost 4 per cent of the total number examined at this camp were given the individual test. The corresponding percentage in the whole Army is about 5 per cent. Of 2,181 men examined, such vital facts as disease history and education were recorded for 1,216.

This group is separated into the whites and the negroes. It is further divided according to the disposition recommended by the psychologist, on the basis of the result of individual examination, as follows: Regular service, development battalion, domestic service, discharge, and "attention of psychiatrist." Because of the few cases, 15 in all, of white men referred to the psychiatrist, this group will drop out of discussion. Recommendation was usually based entirely on mental age determined.

In table 334 are shown the numbers included in each group. From this table it will be observed that almost half (45 per cent of whites, 44.6 per cent of negroes) were recommended for regular service.

The percentage distributions of mental ages in this group are given in table 335 and in figure 53.

The median mental age of the negro group is about one year less than the median for the white group—8.6 and 9.6 years. The medians for the total group individually examined at Camp Sheridan are 8.3 years for the negroes and 9.7 for the whites. This very slight difference shows that the smaller group which is being studied is representative of the total number. It is of interest to note that of men examined individually 82.9 per cent of the whites and 90.4 per cent of the negroes have a mental age of 10 years or under.

TABLE 334.—*Numbers of various recommendations made by psychologist to psychiatrist of men examined individually at Camp Sheridan.*

Recommendation.	White.		Negro.	
	Number.	Per cent.	Number.	Per cent.
Regular service	315	45.0	230	44.6
Development battalion	127	18.1	28	5.4
Domestic service	169	24.1	50	9.7
Discharge	74	10.6	37	7.2
Attention of psychiatrist	15	2.1	171	33.2
Total number of cases	700		516	

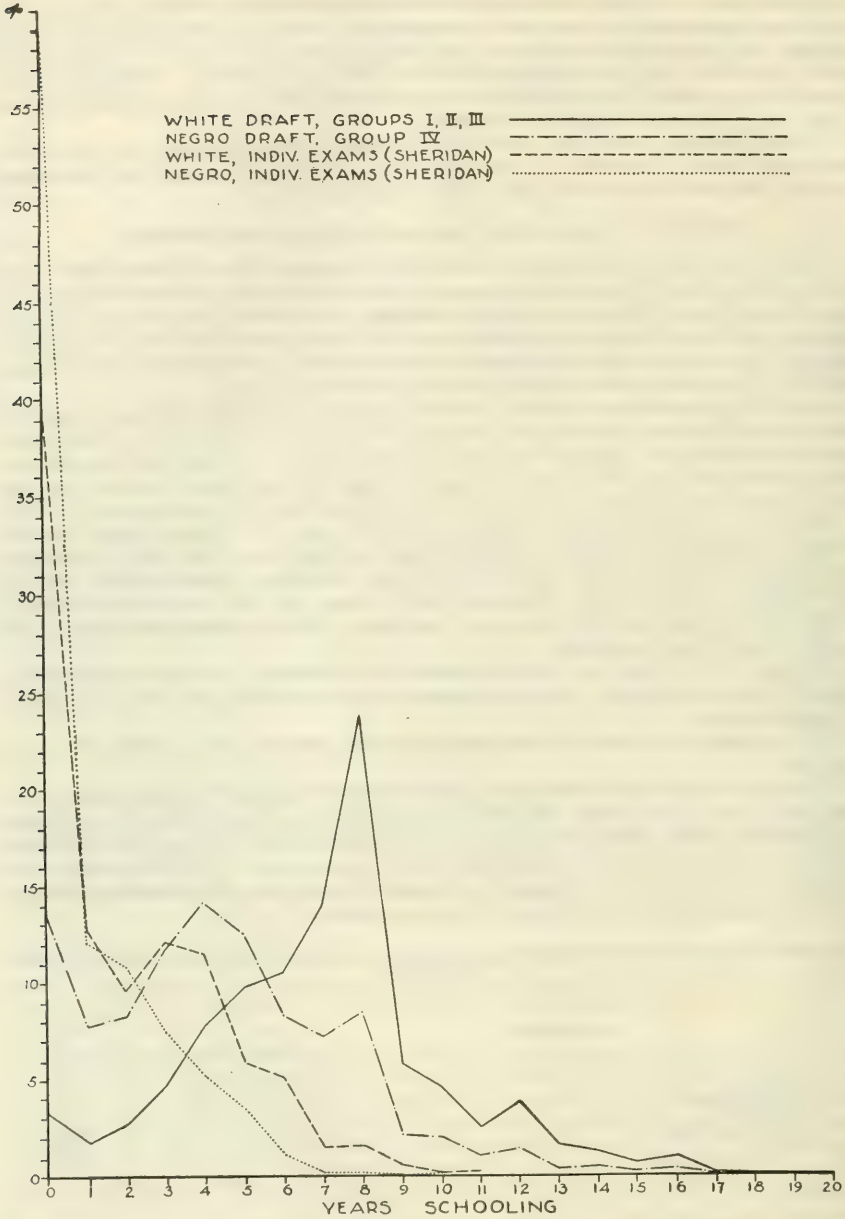


FIG. 53. Per cent distributions of schooling. Recruits individually examined at Camp Sheridan are seen to have dropped out of school much earlier than was usual in the draft as a whole.

TABLE 335.—*Percentage distributions of mental ages of whites and negroes examined individually at Camp Sheridan.*

Color.	Mental age.																	Number of cases.	Median mental age.
	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		
White	0.3	.....	0.1	0.6	3.5	8.3	21.2	27.0	21.9	10.7	3.8	1.3	0.4	0.3	0.3	0.3	0.1	690	9.6
Negro	.2	0.4	.6	1.6	9.3	24.9	20.8	22.7	9.9	4.3	2.7	1.4	.8	.2	.....	.....	.....	514	8.6

Tables 336 and 337, giving the mental age according to recommendation, show the rigid way in which mental age was used as a dividing line for the five types of recommendation.

A study of the disease conditions of these men brings out striking differences, not only between the whites and the negroes, but between the total draft and this group. Separate figures for the whites and negroes in the entire draft are not available. The figures for venereal diseases for the first million men are not valid, because in the early operation of the draft men with these diseases were in many instances rejected by the draft boards. Among the second million men 5.4 per cent were reported by the camp examiner after their first examination at camp as having a venereal disease. This per cent would doubtless come up to 7 after more careful examinations were held.

In the Sheridan group of men examined individually the total number of men with venereal diseases is 70.5 per cent among the negroes, 18.5 per cent among the whites. Of the negroes 33 per cent had both syphilis and gonorrhea, while of the whites only 9.4 per cent had both. Thus the percentage of venereal disease in the negro is about four times as great as in the whites for men of this class. On the other hand, the percentage of chronic diseases is for the negro half what it is for the whites—17.8 per cent for negroes and 34.1 per cent for the whites. Infectious diseases were reported for 4.8 per cent of negroes and 14.4 per cent of whites. It is easily seen from these percentages that the number of men free from disease was small. The whites stand ahead with 33 per cent clear, while only 17.3 per cent of the negroes were clear.

TABLE 336.—*Distribution of whites by recommendation according to mental age.*

Mental age.	Regular service.	Development battalion.	Domestic service.	Discharge.	Camp Grant discharges.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
2	.....	.....	.....	1.4	.....
3	.....	.....	.....	.....	.....
4	.....	.....	.....	1.4	2.8
5	.....	.....	.....	5.3	11.3
6	.....	.....	.....	30.0	23.4
7	0.3	1.6	3.5	62.0	29.1
8	2.0	8.7	74.0	.....	15.6
9	10.1	88.0	21.8	.....	9.2
10	49.5	.....	0.8	.....	3.5
11	24.2	.....	.....	.....	0.7
12	7.5	1.6	.....	.....	0.7
13	2.6	.....	.....	.....	0.7
14	1.0	.....	.....	.....	.....
15	0.7	.....	.....	.....	1.4
16	0.7	.....	.....	.....	0.7
17	0.7	.....	.....	.....	.....
18	0.3	.....	.....	.....	0.7
Total number of cases	305	127	169	73	141

TABLE 337.—*Distribution of negroes by recommendation according to mental age.*

Mental age.	Regular service.	Development battalion.	Domestic service.	Discharge.	Camp Grant discharges.	Psychiatrist.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
2	.....	.....	.....	2.7	1.9	.....
3	.....	.....	.....	2.7	9.5	0.6
4	.....	.....	.....	.....	24.1	1.8
5	.....	.....	.....	16.2	25.3	1.1
6	.....	.....	.....	67.5	22.8	12.3
7	0.8	.....	98	8.1	11.4	43.9
8	4.7	100.0	2	2.7	4.4	39.2
9	51.1	.....	.....	.....	0.6	1.1
10	22.2	.....	.....	.....	.....	.....
11	9.6	.....	.....	.....	.....	.....
12	6.1	.....	.....	.....	.....	.....
13	3.0	.....	.....	.....	.....	.....
14-17	2.5	.....	.....	.....	.....	.....
Total number of cases	229	28	49	37	158	171

Tables 338 and 339, giving the distribution of disease according to the five classes of recommendations, show that there is little relation between the disease conditions and the group for which a man was recommended. Attention is attracted to the negroes in the development battalion, where the largest per cent free from disease were placed, as well as the smallest per cent with venereal disease. With the whites the largest per cent free from disease fall in the regular service group and the next largest in the development battalion. As with the negroes, the smallest per cent of whites with venereal disease are in the development battalion.

TABLE 338.—*Percentage distribution of disease according to psychological recommendations.*

NEGROES.

Disease.	Regular service.	Development battalion.	Domestic service.	Discharge.	Psychiatrist.	Total.
Clear	16.3	29.2	20.4	21.6	16.6	17.8
Chronic	2.3	29.2	14.2	16.2	5.3	6.8
Infectious	1.8	12.5	12.2	2.7	6.0	4.8
Total venereal	79.5	29.2	53.0	59.5	72.1	70.5
Gonorrhea	56.0	28.6	73.0	59.0	56.2	57.1
Syphilis	10.3	28.6	7.7	19.1	9.1	10.0
Both	33.6	43.4	19.2	31.9	34.7	33.0
Number of cases	220	24	49	37	168	498

TABLE 339.—*Percentage distribution of disease according to psychological recommendations.*

WHITES.

Disease.	Regular service.	Development battalion.	Domestic service.	Discharge.	Psychiatrist.	Total.
Clear	39.4	36.2	22.2	25.8	.....	33.0
Chronic	22.9	38.7	43.6	47.4	.....	34.1
Infectious	15.1	14.5	13.8	13.4	.....	14.4
Total venereal	22.6	10.5	20.4	13.4	.....	18.5
Gonorrhea	82.5	84.6	79.5	70	.....	81.3
Syphilis	7.2	15.4	8.7	20	.....	9.4
Both	11.4	0	11.8	10	.....	9.4
Number of cases	305	124	167	74	14	684

By dividing the group, according to mental age, into those with venereal disease and those without, as in table 340, it can be observed that there is but slight difference in the medians of either the negroes or the whites.[1]

[1] Cf. the discussion of the relation of intelligence ratings to venereal disease in The Influence of Certain Physical Factors on the Intelligence Score, pages 812 ff.

TABLE 340.—*Percentage distribution of whites and negroes, by mental age, according to venereal and nonvenereal diseases.*

Mental age.	Venereal.		Nonvenereal.	
	White.	Negro.	White.	Negro.
2	.....	.....	0.2	0.65
3	.....	0.3	.....	0.65
4	.....	0.3	0.2	0.65
5	.....	1.7	0.7	1.3
6	5.6	8.3	2.8	11.04
7	4.8	23.4	9.6	28.6
8	22.2	19.1	21.5	25.3
9	23.8	25.1	26.2	18.8
10	30.2	10.6	21.0	8.4
11	6.4	4.9	11.8	1.95
12	1.6	3.4	3.7	1.3
13	2.4	1.4	1.1	0.65
14	1.6	0.9	0.2	0.65
15	.....	0.3	0.4	.....
16	0.8	.....	0.2	.....
17	0.8	0.3	0.2	.....
18	.....	.....	0.2	.....
Total number of cases	126	350	534	154
Median	9.7	8.8	9.6	8.3

Table 341, which gives the years schooling of the total Army and of this low-grade group, shows the decided lack of education of such men. Thirty-nine per cent of the whites and 59 per cent of the negroes did not even reach the first grade. The medians of the different recommendations show up the years schooling in a definite manner (table 342).

TABLE 341.—*Percentage distribution of years schooling for total draft and for low-grade group at Camp Sheridan.*

Number of years schooling.	Total draft, white.	Total draft, negro.	Sheridan group, white.	Sheridan group, negro.
20	0.01	.....	.....	.....
19	0.01	.01	.....	.....
18	0.04	.....	.....	.....
17	0.10	.02	.....	.....
16	1.03	0.4	.....	.....
15	0.7	0.3	.....	.....
14	1.3	0.5	.....	.....
13	1.6	0.4	.....	.....
12	3.7	1.4	.....	.....
11	2.5	1.1	0.3	.....
10	4.5	2.0	0.2	0.2
9	5.8	2.1	0.6	.....
8	23.8	8.4	1.6	0.2
7	13.9	7.2	1.5	0.2
6	10.5	8.3	5.1	1.2
5	9.7	12.5	5.9	3.5
4	7.7	14.2	11.5	5.3
3	4.7	11.7	12.1	7.5
2	2.7	8.3	9.6	10.8
1	1.8	7.7	12.7	12.2
0	3.3	13.4	39.0	59.0
Total number of cases	69,748	9,192	655	484
Median	7.7	4.6	1.8	0.8

TABLE 342.—*Medians of years schooling.*

Color.	Regular service.	Development battalion.	Domestic service.	Discharge.	Attention of psychiatrist.
White	2.7	1.6	1.8	0.9	.....
Negro	1.09	1.0	0.8	0.6	0.6

The illiteracy of this group is evident: Seventy-five per cent of the negroes and 49.2 per cent of the whites could neither read nor write; 20.2 per cent of the negroes and 40.7 per cent of the whites could both read and write. In a few cases the men could read and not write or vice versa. Of the whites recommended for regular service 36 per cent could neither read nor write; of the whites recommended for discharge 73 per cent could neither read nor write. With the negroes 64.9 per cent of those in the group recommended for regular service could neither read nor write, while 96.4 per cent of those recommended for discharge could do neither.

The weekly salary range of this group of men examined individually runs up to $65 for the whites and $40 for the negroes, with the median of the whites earning $16.60 and the median of the negroes $15. It can be observed from table 343 that 50.2 per cent of the negroes and 41.8 per cent of the whites had a weekly wage of less than $15.

TABLE 343.—*Percentage distribution of weekly wages of whites and negroes.*

Wage in dollars.	White.	Negro.
0– 4	0.3	4.8
5– 9	15.2	19.7
10–14	26.3	25.7
15–19	25.0	24.8
20–24	14.4	13.8
25–29	8.6	7.8
30–34	5.3	2.5
35–39	3.3	0.9
40–44	0.5	.....
45–49	0.3	.....
50–54	0.7	.....
55–59	.....	.....
60–64	0.2	.....
Total number of cases	605	436
Median	16.6	15.0

Over 60 per cent of both whites and negroes were, as might be expected, farmers, laborers, or miners. More than half of these were farmers. The mental ages of the men in these occupations vary only slightly. The median mental ages are given in table 344.

TABLE 344.—*Median of mental ages by occupation.*

Occupation.	White.	Negro.
Farmer	9.5	8.2
Laborer	9.5	9.0
Miner	10.2	9.1

It is of interest that 69.9 per cent of the whites and 83.4 per cent of the negroes held only one job during the year previous to their entrance into the Army; 18.3 per cent of the whites and 11.9 per cent of the negroes held two during the year. As many as 15 different jobs were held in that year by the whites, while 7 was the highest number recorded for the negroes.

The most striking facts relating to this group can be summed up in brief statements:

1. Mental age:
   - The median of the white group has a mental age of 9.6 years.
   - The median of the negroes has a mental age of 8.6 years.
   - 82.9 per cent of the whites and 90.4 per cent of the negroes have a mental age of 10 years or under.
2. Disease:
   - 70.5 per cent of the negroes reported venereal disease.
   - 18.5 per cent of the whites reported venereal disease.

   The per cent for the second million men in the Army is 5.4.
   - 33 per cent of the whites reported no disease.
   - 17.3 per cent of the negroes reported no disease.
3. Education:
   - 39 per cent of the whites had no schooling.
   - 59 per cent of the negroes had no schooling.

   The median of the total white draft had 7.7 years schooling.

   The median of the Sheridan white group had 1.8 years schooling.

   The median of the total negro draft had 4.6 years schooling.

   The median of the Sheridan negro group had 0.8 years schooling.
   - 49.2 per cent of the whites could neither read nor write.
   - 75 per cent of the negroes could neither read nor write.
4. Salary:
   - 41.8 per cent of the whites had a weekly wage of less than $15.
   - 50.2 per cent of the negroes had a weekly wage of less than $15.

SECTION 3.—*Three hundred discharge cases from Camp Grant.*

This study is of the cases of 300 enlisted men who have been returned to civil life because of mental incompetence for military duty through process of rejection on entrance examination or of certificate of discharge for disability. These discharges and rejections were ordered by the authorities at Camp Grant during the period beginning May 1 and ending August 15, 1918. The material is otherwise unselected.

The cases studied are those of 159 Negroes, 144 Caucasians, and 1 Mongolian. All the negroes and 96 of the Caucasians are native born. For convenience, the single Mongolian has been placed in the group of foreign-born Caucasians.

Fifty per cent of the 300 subjects examined gave farming as their principal occupation. Of this number, 47 are native-born whites, 100 are negroes, and 3 are foreign-born whites. The 62 (30.6 per cent) recorded as unskilled laborers are divided as follows: Native-born whites, 13; negroes, 29; foreign-born whites, 20. The remaining 88 are distributed among 30 different occupations.

In collecting data concerning incomes, average weekly earnings for the year preceding the date of entrance into the Army were recorded. The results are not to be contrasted with antebellum figures since the demand for labor which has been growing rapidly since 1914 has greatly increased the earning power even in groups as low in the scale as those of our study.

An accurate estimate of earnings in the 300 cases examined is impossible due to lack of definite information concerning maintenance values which fluctuate according to the social, economic, and geographical distribution of the subjects. Fifty-six (18.6 per cent) received no money compensation whatever and 77 (25.6 per cent) received maintenance in addition to a money return.

With two or three exceptions, these subjects were farmers. A few of the whites were homesteaders and about one-third of the negroes were crop farmers (owners of small farms, renters, or share laborers). The rest were either working for their parents without wages or earning small sums as farm laborers. The maximum weekly cash income for white farmers was $35 (1 case) and for negro farmers $20 (1 case). The average weekly money return for 64 per cent of the white farmers who received a money wage was $13, while for the 52 per cent of negro farmers earning $5 or more per week the average return was $10. Most of these received maintenance in addition to cash. Thirty-six per cent of the white farmers and 33 per cent of the negro farmers received maintenance only. For the 300 cases the average weekly earning power of those receiving a cash compensation exclusive of maintenance, was:

For 76 native-born whites	$14.894
For 124 negroes	10.935
For 43 foreign-born whites	18.302
Average for 300	13.426

The largest single wage recorded is $70 per week. This amount was earned by a white man engaged in the construction of steel ships and probably includes pay for overtime. The subject has a mental age of 9 years, 11 months. He was discharged as a "constitutional inferior" because of obvious mental defect and a long criminal history in civil life and in the Army.

Twenty-three per cent (23.3 per cent) of the total number reported no disease history. Language difficulties, faulty memories, and ignorance of nomenclature on the part of the subjects account to a degree for this high figure. If recourse could have been had to the testimony of civil physicians and relatives, a considerable decrease doubtless would be shown.

Among native-born whites the diseases showing the higher frequencies are: Measles, 14.75 per cent; pneumonia, 14.75 per cent; gastrointestinal troubles, 13.11 per cent; gonorrhea, 11.47 per cent; and rheumatism, 11.47 per cent. Among negroes the higher frequencies are: Gonorrhea, 82.86 per cent; syphilis, 48.57 per cent; malaria, 32.86 per cent; and typhoid fever, 14.29 per cent. Higher disease frequencies in the group of foreign-born whites are: Gonorrhea, 48.28 per cent, and syphilis, 13.8 per cent. The figures for venereal diseases are probably too low, particularly in the syphilis item.

In the cases of 51 native-born whites, 22 negroes, and 11 foreign-born whites, psychoses were diagnosed. In many of these instances, psychotic conditions were coupled with feeble-mindedness.

Three hundred and nine clinical examinations furnished the basis for mental-age reckonings. The distributions for whites and negroes separately have been included in table 333. The average mental ages are as follows:

96 native-born Caucasians	7 years, 11½ months.
159 Negroes	5 years, 6 months.
45 foreign-born Caucasians	7 years.
300 total group	6 years, 10 months.

Ten native-born whites, 108 negroes, and 29 foreign-born whites never went to school. Nine native-born whites, 8 negroes, and 1 foreign-born white attended school for less than one year. Of the total group, 147 did not attend school and 18 spent less than one year in a classroom.

The average attendance time of subjects having one or more years in school is as follows:

77 native-born whites	6.00 years.
43 negroes	3.51 years.
15 foreign-born whites	5.20 years.
135 total group	5.12 years.

The coefficient of correlation between periods of school attendance and mental ages is 0.54.

The second, first, third, and fourth grades show the greatest frequency numbers, having 31, 30, 23, and 23 cases, respectively. Of the whole group 53.3 per cent are illiterate. One individual had completed high-school course and one was a college graduate.

The coefficient of correlation between school grades and mental ages (140 cases) is 0.64.

The rural type preponderates in the cases studied. Not only the 150 farmers but also a great many of those listed as drivers, laborers, railroad section hands, woodsmen, etc., are of country origin. Almost without exception, the foreign-born subjects were of the lower peasant type, while a very small proportion of the negroes could be termed urban dwellers. Approximately 32 of the native whites were city-born.

The natural difficulties attendant upon attempts to obtain sex histories of subjects during a single interview were complicated by language difficulties, low mentality, psychoses, and lack of frankness on the part of many individuals. The data secured are therefore fragmentary. Habitual masturbation was acknowledged by 23 native-born whites, 5 negroes, and 1 foreign-born white. Eleven whites claimed that they had never had sexual intercourse. One case of infantile sex development, one of beastiality, and two of chronic enuresis were found.

CHAPTER 12.

DISCIPLINARY CASES.

The data for the study of disciplinary cases came from two sources. At Camp Dix an extensive examination was made of 939 whites and 484 negroes convicted by summary and special courts-martial from July to November, 1918. Like data were secured for 597 men convicted at Camp Cody and 65 men in the depot brigade stockade at Camp McClellan. Further data were obtained through the study at the United States Disciplinary Barracks at Fort Leavenworth, Kans., of some 3,300 records made by the men confined there.

SECTION 1.—*Level of intelligence of disciplinary cases.*

In the depot brigade at Camp Dix, during the months June and July, 1918, there were 479 white offenders. The figures in tables 345, 346, and 347, which show the distributions of the psychological ratings of these men, indicate that 21 per cent of these offenders had an intelligence rating of E. This means that these men were in the lowest decile of the Army so far as intelligence is concerned. Such a rating means that the psychologist recommends discharge for mental deficiency, assignment to labor or development battalion, or to some duty requiring less than average mentality. Considering the group in relation to what is approximately average intelligence, the C rating, we find that 66.4 per cent of the men are below the average and only 10.4 per cent above it. Comparison with the white draft is significant, for only 7 per cent of the white draft, as shown by the principal sampling for Hollerith analysis, were rated E, and only 47.7 per cent were rated below the average. The percentages show that these low-grade men are two or three times as likely to commit offenses as men of average intelligence, and from four to six times as likely to get into trouble as are men of markedly superior ability.

TABLE 345.—*Numbers of white men in various groups tried by special and summary courts-martial who made each intelligence rating.*

Whites.	D−, E.	D.	C−.	C.	C+.	B.	A.	Total.
Camp Dix, June, July	99	133	86	111	36	9	5	479
Camp Dix, October, November	81	103	114	76	46	25	15	460
Camp Dix, all cases	180	236	200	187	82	34	20	939
Camp McClellan	27	20	13	3	1	0	1	65
Camp Cody, convicted men	19	111	157	157	85	51	17	597
Camp Cody, acquitted men	2	9	11	23	13	9	3	70

TABLE 346.—*Percentages of white men in various groups tried by special and summary courts-martial who made each intelligence rating. Based on table 345 above.*

Whites.	D−, E.	D.	C−.	C.	C+.	B.	A.	Number of cases.
Camp Dix, June, July	20.7	27.7	18.0	23.2	7.5	1.9	1.0	479
Camp Dix, October, November	17.6	22.4	24.8	16.5	10.0	5.4	3.3	460
Camp Dix, all cases	19.2	25.2	21.3	19.9	8.7	3.6	2.1	939
Camp McClellan	41.5	30.8	20.0	4.7	1.5	0	1.5	65
Camp Cody, convicted men	3.2	18.6	26.3	26.3	14.2	8.5	2.9	597
Camp Cody, acquitted men	2.9	12.9	15.7	32.8	18.5	12.9	4.3	70
White draft, principal sample	7.1	17.8	23.8	25.0	15.2	8.0	4.1	94,004

TABLE 347.—*Intelligence ratings of negroes tried by special and summary courts-martial; 484 cases from Camp Dix.*

Negroes.	D−, E.	D.	C−.	C.	C+.	B.	A.	Number of cases.
Numbers	188	161	72	44	14	5	0	484
Per cents	39.2	33.6	15.2	9.2	3.0	1.0	0	484
Per cents, July and August draft, Dix negroes	31	38	16	9.5	3	2	.5	5,258

Approximately the same state of affairs is shown by the study of 460 similar cases taken in October and November. Here there is shown a slightly greater tendency for men of a higher grade of intelligence to become offenders, but the percentage of E grades is still about 18, and there are still 64.8 per cent of the men falling below the average.

There are only a few cases included in the data from Camp McClellan, but the tendency of these cases is unmistakable. Nearly 42 per cent of the offenders rated only E, and 92.3 per cent were below the average.

The figures from Camp Cody seem to contradict the others, but this difference arises because the number of cases here reported is only about 25 per cent of all those tried at the camp; the other 75 per cent were disposed of before the psychological examining was established there. Of approximately 250 men discharged for mental deficiency during the period of these early trials the president of the disability board stated unofficially that "nearly all of them were discharged because they could not keep themselves out of the guardhouse for more than a week at a time." Had these men been retained in the service and confined, they would apparently have composed about 30 per cent of the 850 (600 plus 250) court-martial convictions of the camp. The figures, like those from Camps Dix and McClellan, would then show that this group of mentally deficient men are two or three times more likely to get into trouble than the men of higher mental ability. It is interesting to note that the men who were acquitted rate considerably higher than the convicted men.

Table 347 shows that of the 484 negro offenders whose records were obtained at Camp Dix in October and November, 1918, 39 per cent rated only E. However, it must be noted that 31 per cent of the entire negro draft at this camp during July and August were not able to make more than an E grade. The evidence in the case of the negroes, therefore, is not clear, but it still indicates the same tendency in a lesser degree.

The distribution of the grades received by the Leavenworth prisoners is shown in table 348. When comparison is made with the figures obtained from the principal sampling concerning the white draft, it will be seen that the Leavenworth prisoners form a group which is normal or average. There is a slight tendency to higher ratings than those obtained by the white draft, but it is probably not significant. This fact is rather striking in the face of the figures dealing with the prisoners in the camps. In table 349 the two groups are compared, and the superiority of the Leavenworth men is evident. The facts shown in table 349 are presented diagrammatically in figure 54. It should be remembered that the prisoners at Leavenworth were convicted on serious charges by general courts-martial, while those in the camp were convicted on minor charges. It thus appears that low intelligence is a factor in less serious delinquencies, but in the graver difficulties intelligence as measured by the Army tests seems to play no part.

TABLE 348.—*Intelligence ratings of prisoners confined at United States disciplinary barracks, Fort Leavenworth, Kans.*

Prisoners.	E, D−.	D.	C−.	C.	C+.	B.	A.	Total.
Number	201	633	700	799	538	300	197	3,368
Per cent	6.0	18.8	20.8	23.8	16.0	8.8	5.8	.....
White draft principal sampling	7.1	17.0	23.8	25.0	15.2	8.0	4.1	94,004

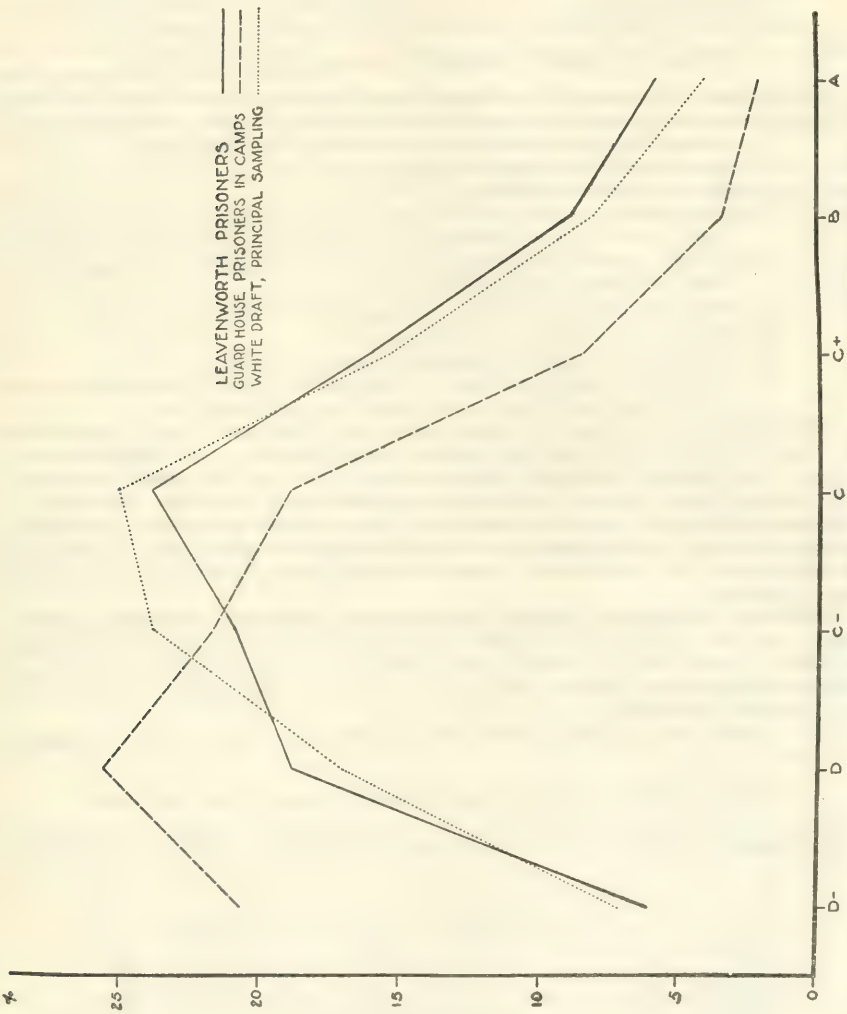


FIG. 54. Comparison of intelligence ratings of prisoners confined in camps and those confined at Fort Leavenworth, based on table 349.

TABLE 349.—*Percentage comparison of intelligence ratings of prisoners confined in camps and those confined at Leavenworth.*

Prisoners.	E, D−.	D.	C−.	C.	C+.	B.	A.	Total.
Dix and McClellan prisoners	20.6	25.5	21.6	18.9	8.3	3.4	2.1	1,004
Leavenworth prisoners	6.0	18.8	20.8	23.8	16.0	8.8	5.8	3,368
White draft principal sampling	7.1	17.0	23.8	25.0	15.2	8.0	4.1	94,004

SECTION 2.—*Relation of intelligence, education, and kind of crime.*

For the purpose of the study of intelligence ratings in various criminal groups, the crimes for which the men were sentenced to Leavenworth were divided into the following categories:

A. Crimes of acquisitiveness, as larceny, robbery, forgery, fraud, etc.
P. Crimes of violence, as assault, fighting, murder, etc.
S. Sex crimes of all descriptions.
M. Purely military crimes, as absence without leave, desertion, escape, sleeping on post, drunk on post, discredit to uniform, allowing escape of prisoners, etc.
G. Military crimes of an aggressive nature, as disrespect to officer, mutiny, disobedience of orders, insubordination, etc.
D. Disloyalty, disloyal statements, disrespect to United States, etc.
R. Conscientious objectors of the religious type.
K. Conscientious objectors of the political type.
Q. Conscientious objectors because of being alien enemies, of having alien enemy relatives, of noncitizenship, and other like draft irregularities.

This classification was made after considerable study of the data at hand, including the past reports of the institution and the personnel cards of the men. The identification and grouping of the conscientious objectors which was used in this study was carried out as a part of the personnel survey made just before the psychological survey took place. The records of 2,416 men make up the data used for this study. There is no reason to believe that there is any factor of selection in this group, for the men were taken at random just as they came to the examinations. It is probable that the results obtained present a good picture of the whole group of prisoners.

The ordinary prisoners and the men in the disciplinary battalion are tabulated in separated groups. The men in the disciplinary battalion are those prisoners whose records during the first month or two of their confinement are such that they are given a trial with the idea of restoring them as soon as possible to the regular organizations of the Army. They are therefore a somewhat selected group.

The following facts concerning the relation of intelligence to kind of crime are shown in table 350:

TABLE 350.—*Percentage of intelligence ratings of Leavenworth prisoners in various crime groups.*

For meaning of letters designating crime groups, see text. "Reg." means regular or ordinary prisoners; "Bat." means disciplinary battalion, a selected group of men held under discipline but with an expectation of early release.

Crime group.	E−, E.	D.	C−.	C.	C+.	B.	A.	Total.
A Reg.	0.6	9.1	16.6	28.2	24.8	12.8	8.2	320
A Bat.	.....	.....	9.5	29.6	33.3	19.0	19.0	21
P Reg.	4.7	19.2	29.0	24.0	14.3	9.5	.....	42
P Bat.	.....	20.0	.....	50.0	10.0	10.0	10.0	10
S Reg.	.....	5.3	11.0	42.2	11.0	26.4	5.3	19
S Bat.	.....	.....	.....	.....	50.0	.....	50.0	2
G Reg.	8.1	20.2	21.6	28.2	12.5	3.1	4.7	128
G Bat.	7.4	11.1	14.8	33.3	18.5	7.4	7.4	27
M Reg.	7.2	19.7	21.6	26.3	13.5	8.6	4.0	1,071
M Bat.	6.2	14.7	25.6	29.6	15.7	8.8	4.3	305
D Reg.	12.4	6.2	.....	34.8	15.7	18.9	12.5	32
D Bat.	.....	.....	50.0	50.0	.....	.....	.....	2
R	0.1	4.1	13.7	27.0	26.5	15.1	12.8	218
K	.....	17.1	10.7	29.5	20.2	13.2	39.3	84
Q	15.3	37.0	21.2	15.5	8.1	2.2	1.5	135
Whole group	4.1	15.7	20.0	26.4	16.6	9.8	6.8	2,416

1. The men in the disciplinary battalion are in general a little above the regular prisoners in intelligence. However, this superiority is very slight, and is perhaps not significant in view of the fact that the number of men in the battalion is small.

2. The men sentenced for acquisitive crimes (group A) are rather decidedly above the average and above most of the other groups.

3. The conscientious objectors of the religious and political groups are high-grade men very markedly above the average of the whole group. This superiority is especially noticeable in the cases of the political objectors.

4. The men classed as conscientious objectors because of being alien enemies, having alien enemy relatives, etc. (Q group), are decidedly low in intelligence. This seems to be the one group in the institution whose troubles we may ascribe to low mentality.

5. Men who commit aggressive crimes of a military nature—disobedience of orders, disrespect to officer, etc.—are somewhat below the average mentality. On the other hand, however, men whose aggressiveness amounts to disloyalty are considerably better than the average group, as less than 20 per cent of them fall below C.

A supplementary study was made of the conscientious objectors who have continually refused to do any work. Of these, six refused to take any examination. The records of the others are given in table 351. The superiority of these men to any other group in the institution is very apparent.

TABLE 351.—*Percentage of intelligence ratings of conscientious objectors in isolation at Leavenworth.*

Group.	D−, E.	D.	C−.	C.	C+.	B.	A.	Total.
Religious	5.0	5.0	20.0	20.0	15.0	25.0	10.0	20
Political	.....	11.7	11.7	.....	11.7	5.9	59.0	17
Total	2.7	8.3	16.4	10.8	13.5	16.4	32.6	37

A study of education in various crime groups, using the same categories as before, was made. The records of 3,041 men were examined, and the results of the study were tabulated in table 352.

TABLE 352.—*Percentage table of education of Leavenworth prisoners in various crime groups. Crime groups designated as in table 350. All numbers except the number of cases express percentages.*

Schooling.	A.		P.		S.		G.		M.		D.		R.	K.	Q.	Whole group.
	Reg.	Bat.	Reg.	Bat.	Reg.	Bat.	Reg.	Bat.	Reg.	Bat.	Reg.	Bat.				
College:																
7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.4	1.1	.....	0.1
6	.....	.....	.....	.....	.....	.....	.....	.....	0.1	.....	.....	.....	.....	1.1	.....	0.1
5	.....	.....	.....	.....	.....	.....	0.6	.....	0.1	.....	6.3	.....	1.1	.....	.....	0.2
4	1.2	3.9	.....	.....	.....	.....	0.6	.....	0.5	0.8	3.0	.....	1.5	2.2	.....	0.8
3	1.2	.....	.....	.....	.....	.....	0.6	.....	0.1	0.6	.....	.....	2.7	3.5	.....	0.6
2	0.9	.....	.....	.....	.....	.....	1.2	3.0	0.6	0.3	6.3	.....	1.5	4.6	.....	0.9
1	2.8	.....	.....	.....	.....	.....	.....	.....	0.4	0.8	6.3	.....	1.9	3.5	0.7	1.0
High school:																
1	4.2	11.2	3.3	10.0	.....	50.0	1.8	.....	2.2	2.8	.....	.....	5.3	9.2	2.7	3.1
3	3.3	7.5	1.7	.....	.....	.....	2.9	3.0	1.4	1.1	.....	.....	3.4	4.6	1.3	2.1
2	5.3	11.2	1.7	10.0	3.6	50.0	3.5	6.3	3.8	4.2	.....	.....	6.5	9.2	0.7	4.3
1	6.5	14.8	5.0	10.0	14.3	.....	2.9	3.0	4.6	5.4	6.3	50.0	6.5	6.9	0.7	5.1
Common school:																
8	17.9	22.4	20.0	20.0	35.2	.....	20.7	31.5	21.2	26.8	22.0	.....	23.4	24.2	6.1	22.5
7	15.3	18.6	8.3	20.0	10.7	.....	11.8	9.5	12.4	15.0	9.5	.....	13.3	8.0	3.4	12.5
6	5.6	3.7	18.3	.....	17.9	.....	13.0	15.7	10.4	8.7	6.3	.....	6.1	6.9	8.2	9.2
5	9.6	.....	15.0	.....	10.7	.....	6.5	9.5	11.5	9.6	9.5	.....	9.8	5.7	8.9	9.9
4	4.9	7.5	10.0	50.0	.....	.....	11.8	3.0	11.2	11.0	3.0	.....	10.6	2.2	14.3	9.8
3	3.3	.....	11.7	.....	7.1	.....	8.9	6.3	7.2	4.5	3.0	.....	1.5	2.2	11.5	6.0
2	2.1	.....	1.7	.....	.....	.....	2.9	.....	3.2	2.3	6.3	.....	1.5	2.2	4.8	2.7
1	2.8	.....	.....	.....	3.6	.....	1.8	3.0	2.0	2.5	3.0	.....	0.7	1.1	10.3	2.8
0	3.3	.....	3.3	.....	.....	.....	8.3	6.3	5.9	3.7	9.5	50.0	2.3	1.1	32.0	6.3
Number of cases	431	27	60	10	28	2	169	32	1,395	355	32	2	264	87	147	3,041

A study of table 352 brings out these facts:

1. For the prison population as a whole the median falls in the seventh grade. There are 81.7 per cent of the men who did not get beyond the common school, 14.6 per cent who had had some high-school work, and 3.7 per cent who got into college.

2. The men in the battalion are on the whole somewhat better educated than the regular prisoners.

3. Men convicted of sex crimes and crimes of violence have less education than the group average and less than most of the other groups.

4. The religious and political conscientious objectors are the best educated of the inmates.

5. The men convicted of the acquisitive crimes have more education than the average, and more than any of the other groups except the religious and political objectors.

It is a noticeable fact that there is a marked relationship between the intelligence and the education of the various crime groups. For the study of this relationship three groups were selected: (1) Prisoners not conscientious objectors; (2) conscientious objectors; and (3) the two groups combined. In classifying the men as to education the highest grade reached was the group into which each man was put. Four groups were made for the men who had more than a common school education: (1) Men who got into high school, but did not graduate; (2) high school graduates; (3) men who got into the university, but did not graduate; and (4) university graduates.

The results of this study are set forth in tables 353 to 356.

TABLE 353.—*Percentage table showing the schooling of the Leavenworth prisoners not conscientious objectors in each intelligence group.*

Schooling.	E.	D.	C−.	C.	C+.	B.	A.
University graduate	.....	.....	.....	0.1	0.5	0.5	3.1
University	.....	0.2	.....	0.5	0.6	4.8	13.4
High school graduate	.....	.....	.....	0.8	4.7	5.7	10.3
High school	.....	1.2	2.1	6.8	11.7	20.5	30.0
Eighth grade	0.8	5.4	8.4	18.7	28.2	24.8	20.7
Seventh grade	2.5	3.9	11.0	14.7	19.0	20.5	10.3
Sixth grade	5.9	10.0	15.2	20.6	14.8	7.6	3.1
Fifth grade	3.3	13.2	16.7	14.3	9.5	6.2	6.2
Fourth grade	6.7	12.4	17.6	11.5	5.3	5.7	2.1
Third grade	14.3	15.6	14.4	6.5	2.0	1.9	.....
Second grade	8.4	12.0	4.8	1.7	1.4	1.4	1.0
First grade	13.5	8.5	3.3	1.5	0.6	.....	.....
No schooling	43.0	17.6	6.8	2.2	1.4	0.5	.....
Number of cases	119	410	474	600	359	210	97

TABLE 354.—*Percentage table showing the schooling of conscientious objectors at Leavenworth in each intelligence group.*

Schooling.	E.	D.	C−.	C.	C+.	B.	A.
University graduate	.....	.....	.....	.....	2.1	2.0	13.6
University	.....	2.6	1.4	.....	1.0	12.3	30.4
High school graduate	.....	.....	1.4	4.0	1.0	6.1	7.5
High school	.....	.....	.....	7.0	17.6	26.6	19.7
Eighth grade	.....	3.9	7.2	15.2	33.0	30.7	15.2
Seventh grade	.....	9.1	8.7	14.2	14.2	6.1	4.5
Sixth grade	.....	5.2	15.9	13.2	5.4	6.1	4.5
Fifth grade	5.3	7.3	14.5	15.2	11.4	2.0	.....
Fourth grade	10.4	3.9	24.6	17.2	7.2	2.0	3.0
Third grade	5.3	18.2	7.2	8.1	4.1	4.1	1.5
Second grade	10.4	11.7	4.3	1.0	.....	.....	.....
First grade	5.3	7.3	11.6	1.0	1.0	.....	.....
No schooling	63.4	29.9	2.9	4.0	2.1	2.0	.....
Number of cases	19	77	69	99	97	49	66

TABLE 355.—*Percentage table showing the schooling of all Leavenworth prisoners in each intelligence group.*

Schooling.	E.	D.	C−.	C.	C+.	B.	A.
University graduate	.....	.....	.....	0.1	0.9	0.8	7.4
University	.....	0.6	0.2	0.4	0.9	6.2	20.0
High school graduate	.....	.....	0.2	1.3	4.0	5.8	9.2
High school	.....	1.0	1.9	6.8	13.0	21.6	25.8
Eighth grade	0.7	5.1	8.2	18.2	29.2	26.9	18.4
Seventh grade	2.2	4.7	10.7	14.6	18.0	17.8	8.0
Sixth grade	5.1	9.3	15.3	19.6	12.7	7.3	3.7
Fifth grade	3.6	12.4	16.1	14.5	9.9	5.4	3.7
Fourth grade	7.3	11.1	18.5	12.3	5.7	5.0	2.5
Third grade	13.0	16.1	13.4	6.7	2.4	2.3	0.6
Second grade	8.7	11.9	4.6	1.6	1.1	1.2	0.6
First grade	12.3	8.4	4.4	1.4	0.9	.....	.....
No schooling	45.8	19.5	6.3	2.4	1.5	0.8	.....
Number of cases	138	487	543	699	429	259	163

TABLE 356.—*Products-moments coefficients of correlation between intelligence and education of Leavenworth prisoners.*

Crime group.	r	P. E.
Non-conscientious objectors	0.696	0.008
Conscientious objectors	.712	.015
Combined	.698	.007

Both the percentage tables and the correlation coefficients indicate a close relationship between intelligence and education. It is especially noticeable that the larger part of the E men got little or no schooling, while of the A men only about 13 per cent failed to get at least a common school education.

SECTION 3.—*Recidivism and its relation to intelligence.*

Data for the study of recidivism among the military prisoners at Leavenworth became available through records obtained in the psychiatric survey which took place coincidently with the mental testing. The records of the man's previous criminal history were obtained by the psychiatrists in an interview and are perhaps not altogether trustworthy. It was the general belief, however, among the men who did the examining that the prisoners were for the most part truthful in their reports. Another source of error in the figures given here lies in the fact that some of the worst cases were in isolation or solitary confinement and so could not be examined by either psychiatrists or psychologists. It is more than likely that some of the worst recidivists were in this group.

On the basis of the records the prisoners were classed into what may be called, for want of a better term, recidivist groups. These groups were as follows: (1) Men reporting no previous criminal history; (2) men who had been found guilty of minor delinquencies, such as drunkenness, disorderly conduct, violation of the traffic regulations, and who had been punished by fines or short sentences in jails, workhouses, and such institutions; (3) men who had been sentenced to reformatories; (4) men who had served time for serious offenses in prisons and penitentiaries. In case a man's record was such that he would fall in two or more of these groups he was classified according to his worst offense.

It became apparent as soon as the figures were examined that the results were affected by the inclusion of the political prisoners. Because of this fact tables were prepared giving separately data for conscientious objectors and ordinary prisoners, as well as a combination including the entire group. A comparison of the recidivist records of the conscientious objectors and other prisoners (see table 357) shows that very few of the former have gotten into difficulties previous to their becoming a part of the military establishment. It should be noted that these previous difficulties were probably also the result of political or religious beliefs and activities.

TABLE 357.—*Percentage comparison of previous criminal records of conscientious objectors and nonobjectors.*

Previous criminal history.	Non-objectors	Objectors.	Combined group.
No criminal history	60.0	93.5	65.7
Minor delinquencies	29.4	5.9	25.3
Reformatory	7.3	0.6	6.5
Prison or penitentiary	3.2	.0	2.7
Number of cases	2,320	173	2,795

Tables 358, 359, and 360 show the distribution of recidivist groups of men making each intelligence rating. It is quite clear that the A men and the E men have less difficulties than others, for among the A men 82.1 per cent, and among the E men 78.9 per cent, admit no previous criminal history. However, a fair percentage of the E men did get into minor difficulties. It is hard to choose from the other intelligence groups the one which contains the greater per cent of repeated offenders. The C, B, and D men have slightly higher records of recidivism, but the C+ and C men are not very different. The facts seem to be practically the same both for

the separate groups and for the group of Leavenworth prisoners as a whole. In tables 361, 362, and 363 the data are presented in another way. These tables show the percentage of the different intelligence ratings in each recidivist group. Comparing the figures with the percentages for the total group, the men admitting no criminal history have comparatively more A's and more E's. The men having prison or penitentiary records contains 56 per cent of C and D men.

TABLE 358.—*Percentage distribution by recedivist group of nonobjectors making each intelligence rating.*

Group.	E.	D.	C−.	C.	C+.	B.	A.	Whole group.
No criminal history	74.8	57.5	55.6	60.0	62.1	56.0	71.0	60.0
Minor delinquencies	24.3	32.4	34.6	26.3	27.2	30.5	19.0	29.4
Reformatory	0.9	6.1	7.2	9.6	8.3	9.4	8.0	7.3
Prison or penitentiary	.....	4.3	2.7	3.8	2.5	4.2	2.0	3.2
Number of cases	111	441	489	604	362	213	100	2,320

TABLE 359.—*Percentage distribution by recedivist group of conscientious objectors making each intelligence rating.*

Group.	E.	D.	C−.	C.	C+.	B.	A.	Whole group.
No criminal history	10.0	84.6	94.0	95.0	96.8	87.5	98.6	93.5
Minor delinquencies	.....	15.4	6.0	4.0	3.2	8.3	1.4	5.9
Reformatory	.....	.....	.....	1.0	.....	4.2	.....	0.6
Prison or penitentiary	.....	.....	.....	.....	.....	.....	.....	.....
Number of cases	21	78	67	99	93	48	67	473

TABLE 360.—*Percentage distribution by recedivist group of all Leavenworth prisoners making each intelligence rating.*

Group.	E.	D.	C−.	C.	C+.	B.	A.	Whole group.
No criminal history	78.9	60.4	60.1	65.6	69.3	61.7	82.1	65.7
Minor delinquencies	20.4	29.2	31.1	23.1	22.2	26.6	12.0	25.3
Reformatory	0.8	5.1	6.3	8.3	6.6	8.3	4.1	6.5
Prison or penitentiary	.....	3.6	2.3	3.2	1.9	3.4	1.2	2.7
Number of cases	132	529	556	703	455	261	167	2,795

TABLE 361.—*Percentage distribution of intelligence ratings of nonobjectors in each recedivist group.*

Group.	E.	D.	C−.	C.	C+.	B.	A.	Number of cases.
No criminal history	6.0	18.2	19.6	26.4	16.2	8.6	5.1	1,387
Minor delinquencies	4.0	21.0	25.0	23.4	14.4	9.6	2.8	679
Reformatory	0.6	15.1	19.6	32.6	16.8	11.2	4.5	179
Prison or penitentiary	.....	25.4	17.4	30.8	12.0	12.0	2.7	75
Whole group	4.8	19.1	21.1	26.4	15.1	9.2	4.3	2,320

TABLE 362.—*Percentage distribution of intelligence ratings of conscientious objectors in each recedivist group.*

Group.	E.	D.	C−.	C.	C+.	B.	A.	Number of cases.
No criminal history	4.7	15.0	14.2	21.3	20.5	9.5	15.0	442
Minor delinquencies	.....	43.0	14.3	14.3	10.7	14.3	3.6	28
Reformatory	.....	.....	.....	33.3	.....	66.7	0	3
Prison or penitentiary	.....	.....	.....	.....	.....	.....	.....	.....
Whole group	4.5	16.5	14.2	20.9	19.7	10.1	14.2	473

TABLE 363.—*Percentage distribution of intelligence ratings of all Leavenworth prisoners in each recedivist group.*

Group.	E.	D.	C−.	C.	C+.	B.	A.	Number of cases.
No criminal history	5.7	17.4	18.3	25.1	17.2	8.8	7.6	1,831
Minor delinquencies	3.8	21.7	24.4	23.1	14.3	9.7	2.8	707
Reformatory	0.6	16.7	21.6	36.6	18.5	13.6	4.5	182
Prison or penitentiary	.....	25.4	17.4	30.6	12.0	12.0	2.7	75
Whole group	4.7	19.0	19.9	25.1	16.2	9.2	6.0	2,795

There are two important conclusions which may be made on the basis of the foregoing figures. First, probably not more than 50 per cent of the military prisoners were men who got into trouble in civil life; second, men of very high and very low intelligence seem less likely to get into difficulties, at least in civil life, than other men.

A question which psychologists were frequently called upon to decide in connection with disciplinary cases was, "Is this man of such mentality that he can be held responsible for his misdemeanors?" On the basis of mental age, leaving out pathological nervous conditions, heredity, training, and like effects, it may be possible to answer yes or no, though it is hard to fix an exact limit below which a man is to be considered irresponsible and above which he is to be held strictly accountable. Rather should we have a series of degrees of responsibility correlated with a series of degrees of intelligence. Probably men rated E should not be held responsible in a court-martial; the frequency with which they get into trouble and their failure to profit by discipline are presumably the result of mental limitations. Such a conclusion is supported by the nature of their offenses, which are for the most part of the minor sort that are conditioned more upon lack of judgment than upon malicious intent. The frequency of delinquency among men of average intelligence indicates that defective intelligence is only one of many factors that lead to military offenses. In a large number of cases military offenses among men of average intelligence must be due to military conditions, for the percentage of recidivism is not high. Political causes and unjust operations of the military system itself undoubtedly account for most of the intelligent novices in offense. With such cases the psychologist in the Army can do nothing. His activities can not go farther than a designation of those few low-grade men who can not be held responsible in any practical degree under military régime.

SECTION 4.—*Intelligence of prostitutes.*

Psychological examination of female prostitutes was conducted in the neighborhood of several camps by Army psychologists through the cooperation of military authorities and various local or national agencies, such as the United States Public Health Service, the War Training Camp Activities, civilian police officials, and law and order societies.

The most complete data available are for the Port of Embarkation, Newport News, Va.[1] Here prostitutes were examined regularly upon admission to the city detention home. The Goddard revision of the Binet-Simon scale was used in order to secure uniformity with the work of a previous examiner. The women came from almost every part of the United States east of the Mississippi River and some from beyond. The outstanding result of their examination is that 53 per cent (44 per cent white and 68 per cent colored) showed a mental age of 10 years or under (see table 364), and that 35 per cent of the group showed themselves to be in year 10. While in all probability a part of this group is concentrated at year 10 solely because of the nature of the scale used, yet other investigations also show in general that the prostitute is usually not an institutionally deficient woman but a high-grade moron. A psychiatric examination of this group of women showed that 15 per cent were abnormal in some other respect, as alcoholics, drug addicts, epileptics, or as having dementia præcox.

[1] For a more extensive treatment of this work, see Mertz, P. A., Mental Deficiency of Prostitutes, Jour. Amer. Med. Asso., vol. 72, May 31, 1919, pp. 1597–1599.

TABLE 364.—*Distribution of mental ages of 126 prostitutes on the Binet-Simon (Goddard revision) examination. (Port of Embarkation, Newport News, Va.)*

Mental age.	Cases.	Per cent of cases at each age.	White.		Colored.		Higher and lower levels.
			Number.	Per cent each age.	Number.	Per cent each age.	
6- 6.9	3	2.4	.....	.....	3	6.4	53.2 per cent with a mental age of 10 or under.
7- 7.9	4	3.2	.....	.....	4	8.4	
8- 8.9	6	4.8	3	3.8	3	6.4	
9- 9.9	7	5.5	5	6.2	2	4.2	
10-10.9	47	37.3	27	34.3	20	42.8	
11-11.9	15	11.9	8	10.1	7	14.9	
12-12.9	7	5.5	3	3.8	4	8.4	46.8 per cent with a mental age of 11 or over.
13-13.9	7	5.5	6	7.6	1	2.1	
14-14.9	4	3.2	4	5.1	.....	.....	
15-15.9	17	13.5	14	17.7	3	6.4	
Adult	9	7.2	9	11.4	.....	.....	
Total	126	100.0	[1] 79	100.0	[2] 47	100.0	

[1] Or 62.8 per cent. [2] Or 37.2 per cent.

A group of 39 questionable women were examined at Ross County Infirmary, Ohio, by the psychologists at Camp Sherman. This group was given examination alpha. No one scored A; 5 per cent scored B; 8 per cent, C+; 28 per cent, C; 28 per cent, C−; and 31 per cent, D. By transmuting these scores into mental age (correlation with the Stanford-Binet scale) we find that 31 per cent of this group had a mental age of 10 or under. A psychiatric examination by an officer of the Medical Corps showed 15 per cent of this group also to be abnormal in other ways.

At Camp Greenleaf 71 prostitutes were examined in the Crittenton Home, Chattanooga, Tenn., adjoining the camp. The psychological record cards of these women show the following distributions:

Stanford-Binet examination, 45 cases:									
Mental age	6	7	8	9	10	11	12	13	14
Number of cases	1	6	8	15	5	4	1	3	2
Alpha examination, 26 cases:									
Letter grade	D−		D	C−	C	C+		B	A
Number of cases	1		3	11	9	2		0	0

By transmuting the numerical score for the above alpha examinations into the corresponding mental age we obtain the data presented in table 365. The combined result shows again very clearly the low intelligence of prostitutes. There are 50.7 per cent with a mental age of 10 or under. This result agrees closely with the data from Newport News, which, although quite differently derived geographically, showed 53.2 per cent with a mental age of 10 or less.

TABLE 365.—*Distribution of mental ages of 71 prostitutes on the Stanford-Binet examination (Chattanooga, Tenn.—Camp Greenleaf examiners).*

Mental age.	Race, white.		Higher and lower levels.
	Number of cases.	Per cent of cases at each age.	
6- 6.9	1	1.4	50.7 per cent with a mental age of 10 or under.
7- 7.9	6	8.4	
8- 8.9	9	12.7	
9- 9.9	15	21.1	
10-10.9	5	7.1	
11-11.9	13	18.3	49.3 per cent with a mental age of 11 or over.
12-12.9	6	8.4	
13-13.9	11	15.5	
14-14.9	4	5.7	
15-15.9	1	1.4	
Total	71	100.0	

In summary we may note that (1) the results of Army examining of prostitutes corroborate the conclusion, attained by civilian examinations of prostitutes in various parts of the country, that from 30 to 60 per cent of prostitutes are deficient and are for the most part high-grade morons; and (2) that 15 to 25 per cent of all prostitutes are so low-grade mentally that it is wise (as well as possible under the existing laws in most States) permanently to segregate them in institutions for the feeble-minded.

CHAPTER 13.

INFLUENCE OF CERTAIN PHYSICAL CONDITIONS ON THE INTELLIGENCE SCORE.

Typhoid inoculation.—Because of the criticisms frequently urged regarding the possible injurious effects of a recent typhoid inoculation on performance in the psychological examination, a comparison was made at Camp Custer of the intelligence scores of 178 men who had been given their complete inoculation approximately 24 hours before examination with the scores of 239 men of the same unit who had not had recent inoculation and also with the scores of the entire increment of the same month, 7,167 men.

The first comparison made was between 70 men, who themselves judged that their showing on the scale had been affected by their recent inoculation, and the remaining 108 men, who felt this to have had no effect. The means are practically identical.

Typhoid inoculation.	Number of cases.	Mean score.	Standard deviation.
Men reporting effect from inoculation	70	67.4	33.5
Men reporting no effect from inoculation	108	67.9	38.8

Comparing next the means of those recently inoculated with those not recently inoculated we have:

Typhoid inoculation.	Number of cases.	Mean score.	Standard deviation.	Probable error.	Probable error of the mean.
Recently inoculated	178	67.7	33.5	22.6	1.70
Not recently inoculated	239	74.2	35.3	23.8	1.54

Difference between means 6.5
Probable error of difference of the means 2.29
Ratio of the difference to probable error of difference 2.84

The difference found in the last comparison is of doubtful significance in view of the fact that this group contained a good many superior men, who were being held over in the depot brigade because of possible fitness for officers' training camps. The following comparison of the inoculated group with the 7,167 men who made up the entire July, 1918, increment is deemed more satisfactory:

Typhoid inoculation.	Number of cases.	Mean score.	Standard deviation.	Probable error.	Probable error of the mean.
Recently inoculated	178	67.7	33.5	22.5	1.60
Entire July increment	7,167	67.1	35.6	24.0	.284

Difference between means 0.6
Probable error of difference of the means 1.62
Ratio of difference to probable error of difference 0.37

The results seem to show that no significant effect on alpha scores is produced by taking the examination 20 to 24 hours after an antityphoid inoculation, and that the men's own judgment on this point is unreliable. There are four chances in five that with another pair of samples the difference would be reversed.

Hookworm disease.—A comparison was made at Camp Travis between the intelligence scores of 632 white men and 130 negroes who were infected with hookworm and the scores of 5,615

white men and 2,877 negroes who were free from the disease. The comparison included both alpha and beta scores and involved the following numbers:

Hookworm disease.	White.		Negro.	
	Alpha.	Beta.	Alpha.	Beta.
Infected	501	131	74	56
Noninfected	4,792	823	1,817	1,060
Total	5,293	954	1,891	1,116

The percentage distributions of weighted scores for the white alpha groups, 501 infected and 4,792 noninfected, were as follows:

Hookworm disease.	Weighted score (alpha).								Mean.	Probable error of mean.	Standard deviation.
	0- 49	50- 99	100-149	150-199	200-249	250-299	300-349	350-414			
Infected	30.3	29.5	21.0	12.0	4.6	1.6	0.8	.....	94.38	2.85	63.83
Noninfected	13.7	25.9	25.4	18.1	10.5	4.5	1.5	0.3	118.50	1.03	71.23

The difference is too large to be explained as the chance result of sampling. The ratio of the difference of the means to the standard deviation of that difference is 7.96, which means that the chances are infinitely small (less than 1 in 10,000) that as great a difference could occur by chance.

The percentage distributions of scores for the 131 infected and 823 noninfected white men who took beta were as follows:

Hookworm disease.	Weighted score (beta).						Mean.	Probable error of mean.	Standard deviation.
	0- 29	30- 59	60-89	90-119	120-149	150-212			
Infected	32.0	42.8	18.3	5.3	0.8	0.8	45.38	2.46	28.19
Noninfected	29.5	33.4	20.8	11.2	4.5	0.6	53.26	1.19	34.18

Chances that as great a difference could result from sampling are 48 in 1,000.

The percentage distributions of scores for the 74 infected and 1,817 noninfected negroes who took alpha were as follows:

Hookworm disease.	Weighted score (alpha).						Mean.	Probable error of mean.	Standard deviation.
	0-49	50-99	100-149	150-199	200-249	250-414			
Infected	74.3	21.6	2.7	1.4	.....	.....	34.86	3.49	29.98
Noninfected	71.6	19.9	6.1	2.0	0.3	0.1	40.82	.91	38.77

The corresponding comparison for the 56 infected and 1,060 noninfected negroes who took beta:

Hookworm disease.	Weighted score (beta).					Mean.	Probable error of mean.	Standard deviation.
	0-29	30-59	60-89	90-119	120-212			
Infected	71.4	23.2	5.4	0.0	0.0	22.14±	2.69	20.15
Noninfected	65.6	26.1	6.6	1.1	0.5	26.09±	.70	22.80

In the case of the negroes, both in the alpha and beta group, the chances are very great (826 in 1,000) that a difference as large as that found could have resulted from errors of sampling. This is in marked contrast with the findings for white men, and the results may mean that hookworm disease has a more serious effect on whites than on negroes.

There is available also a report from Camp Lee on the scores in examination *a* of 97 white men infected with hookworm disease. Of 121 who appeared for psychological examination, 20 per cent were found to be illiterate, as against 18 per cent illiterate for the regiment as a

whole. The median of the distribution of the 97 literates who took examination *a* is 89, whereas the median for the entire regiment is 102. Comparing the frequencies of the two distributions we find the chances to be only 14 in 1,000 that as great a difference could have occurred by sampling. This result tends to confirm the data obtained from Camp Travis.

It is important, however, to guard against the assumption that data of this kind prove the existence of a causal relation between hookworm disease and mental inferiority. Low native ability may induce such conditions of living as to result in hookworm infection, or poor environmental conditions may be responsible for both the disease and the low test record.

Venereal disease.—Camp Meade reported intelligence ratings (by letter grades from alpha, beta, and individual examinations) of a development battalion composed of 1,231 negro venereals. Their grades are here compared with those of 32,916 unselected negroes of several draft increments. The percentage distributions of grades were as follows:

Colored group.	Intelligence grade.						
	E or D−.	D.	C−.	C.	C+.	B.	A.
Venereals (1,231 cases)	15.1	48.2	20.5	11.3	3.5	1.3	0.4
Unselected draft (32,916 cases)	18.8	51.6	19.1	7.4	2.1	0.7	0.3

Compared with unselected white recruits both groups are very inferior, but the venereal group is slightly superior in intelligence to the nonvenereal. The difference, however, is no greater than the differences frequently found between negro draft increments from different sections of the country. Unfortunately the geographical origin of this venereal group is not known.

Following are figures for 1,562 white venereals composing four companies of another development battalion also reported from Camp Meade. The 167,035 cases with which they are compared include unselected white draft increments from ten different camps and are probably fairly representative of white recruits for the entire country. As before, the ratings include those from alpha, beta, and individual examinations.

White group.	Intelligence grade.						
	E or D−.	D.	C−.	C.	C+.	B.	A.
Venereals (1,562 cases)	4.2	22.6	22.6	26.4	14.6	6.7	2.9
Unselected draft (167,035 cases)	1.7	20.6	25.4	25.4	14.9	7.9	4.0

Here we find an evident inferiority of the venereal group, though the difference is not great. It should be emphasized, however, that comparisons of this kind, even if they disclosed large differences between the intelligence scores of venereal and nonvenereal groups, could not be accepted as throwing any light on the possible influence of the venereal condition on mental efficiency. Such a difference might be more reasonably interpreted as an indication that men of inferior intelligence are more likely to expose themselves to venereal infection or less likely to employ suitable prophylactic measures. In view of this possibility the following study from Camp Lee is of interest.

Camp Lee reported the psychological grades of 317 white venereals. In this case the psychological examination had been given several months before the men were segregated for venereal disease. The grades are, therefore, not those of venereals, but of men who later became venereal. The median weighted score on examination *a* for these 317 white literates was 117, as compared with 142 for the white literates of the entire camp at the time of the examination. The per cent of venereal cases obtaining a grade of A or B was 4.4, as compared with 10 per cent for the entire camp; and the per cent making D or E was 40, as compared with 26 for the entire camp. From these figures it would appear that men of inferior intelligence were considerably more likely than men of superior intelligence to contract venereal disease under the conditions of Army life prevalent in that camp at that time.[1]

[1] Cf. the discussion of venereal disease among men examined individually, chapter 11, this part, pages 791 ff.

CHAPTER 14.

RELATION OF INTELLIGENCE RATINGS TO AGE.

The dependence of intelligence upon age of adults is a theoretical problem of great interest upon which, however, the results of psychological examining in the Army can throw little light. It is possible to draw up tables of intelligence ratings and age as reported on the examination blank, to compute the regressions, and thus to determine the relation between age of officers or of men in the Army and their intelligence; but with the relationship once determined there is still no way of saying to what extent it reflects a fundamental dependence of intelligence upon age or to what extent it may be caused by the selective processes always at work in separating the Army from the total population of the country. If among the older men only the more intelligent sought to be officers or were so well established in life that they could afford to be officers, or if, on the contrary, among the older men only the poorer professional men could leave their businesses to enter the Army or were industrially unessential so that they were forced into the Army, then we should find a very positive relation of the one sort or the other between intelligence and age in the Army—a relation which would arise entirely as a result of selection in the Army and be utterly factitious as an indicator of a dependence of intelligence on adult age in general. Similar selective factors might work equally well in the case of drafted men. At best, then, we can not expect much from a study of age and intelligence ratings in military records, and for this reason, under the pressure of time and insufficient clerical personnel, the Hollerith sortings between age and intelligence ratings of the white and the negro drafts as originally planned for the principal sample were abandoned. The sortings were carried out for officers because the greater range of ages made some sort of a positive relationship, whatever its interpretation, likely.

These figures are available and to them may be added the results of studies on either examination *a* or alpha from six camps. The results are for the most part self-consistent in that they show a slight but persistent tendency for decrease of mean intelligence rating with age—at least in the higher age groups which range above the upper limit of the draft. They are presented in order that the facts may be at hand. In view of our ignorance of the operation of the selective forces in the Army it is unsafe for us to assert that the apparent relation is not spurious. The most reasonable surmise is that older officers are selected more on the basis of their specific experience and training, professional or military, and less on native intelligence than are younger officers who have as yet little valuable experience. Given time for it to accrue, it may be that experience offsets intelligence in the requisites for an Army officer. The Medical Corps, for example, is distinctly a professional corps and its officers are consequently on the average much older than any other group of officers (see below). The low level of the intelligence ratings in this corps may be in part due to the selection of officers on the basis of professional experience and availibility rather than on general mental ability.[1]

It has been argued that older officers are at an unfair disadvantage in the alpha examination in that they have the kind of intelligence that works surely but slowly—that alpha is a "speed test."[2] It was never clear in practice, however, that the older officers actually did do more poorly than the younger; it appeared as if it might be that the older officers who made poor ratings simply attracted to themselves more attention than did the young officers

[1] But it is not probable that the intelligence level of the Medical Department is entirely to be explained in this manner. The younger officers of the Dental and Veterinary Corps score lower on the average than the officers of the Medical Corps.

[2] See the discussion of alpha as a "speed test" in the chapter on the Effect of Doubling the Time Limits in the Alpha and Beta Examinations, chapter, 9, Part II, pages 415 to 420.

with low grades. The present data do seem to establish the fact of a definite tendency for the older men to obtain slightly lower scores than the younger; the difference is as it has been claimed but it is not great. The interpretation of this tendency is another matter; it can not be said on the basis of present information to point to a decrease of intelligence with age, or even to a decrease with age of the ability to succeed in the so-called "speed test" alpha.

Table 366 gives the comparative data on 15,385 white officers from Group VI of the principal sample. These data are shown graphically in figures 55 and 56. The class intervals of age are those coded in the principal sample; they proceed by two-year intervals within the limits of the draft (i. e., up to 30 years) and thereafter by decades. It will be noted that the A ratings decrease and the C ratings increase with age. The medians regularly decrease. The graphic representation in figures 55 and 56 is striking. The extreme groups (less than 21 and above 60 years) are the smallest in size and may be left out of account in the general tendency.

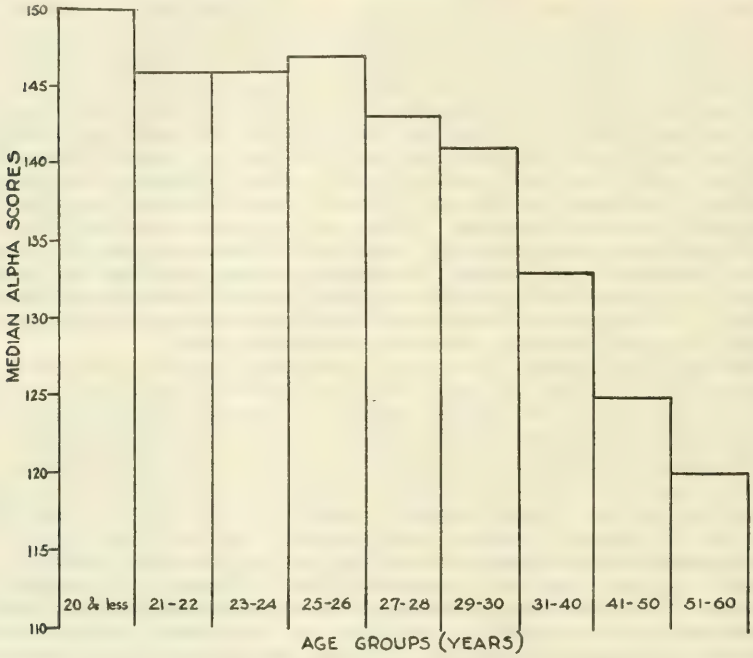


FIG. 55. Intelligence ratings and age. Median alpha scores for different age groups of 15,385 white officers.

TABLE 366.—*Relation of age to intelligence rating: 15,385 white officers of Group VI of the principal sample. Examination alpha.*

Intelligence rating.	20 and less.	21-22	23-24	25-26	27-28	29-30	31-40	41-50	51-60	60 up.
A	66.8	66.9	63.6	60.3	60.3	57.4	49.1	40.0	34.0	62.5
B	29.2	24.7	27.7	28.3	25.9	28.1	30.1	31.4	32.7	25.0
C+	4.2	6.5	7.8	9.7	11.1	11.6	15.5	21.1	21.2	0
C	.....	1.5	1.2	1.8	2.2	2.4	4.9	6.4	10.2	12.5
C−	.....	.1	.1	.....	.1	.1	.6	.7	2.0	.....
D	.....	.....	.....	.....	.....	.1	.....	.3	.....	.....
D−	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Median	150	146	146	147	143	141	133	125	120	140
Probable error	20	20	20	21	19	23	25	21	25	15
Number of cases	24	985	2,330	2,434	2,101	1,665	3,963	1,635	240	8
Per cent of number of cases	.2	6.4	15.2	15.9	13.8	10.9	25.8	10.6	1.6	.1

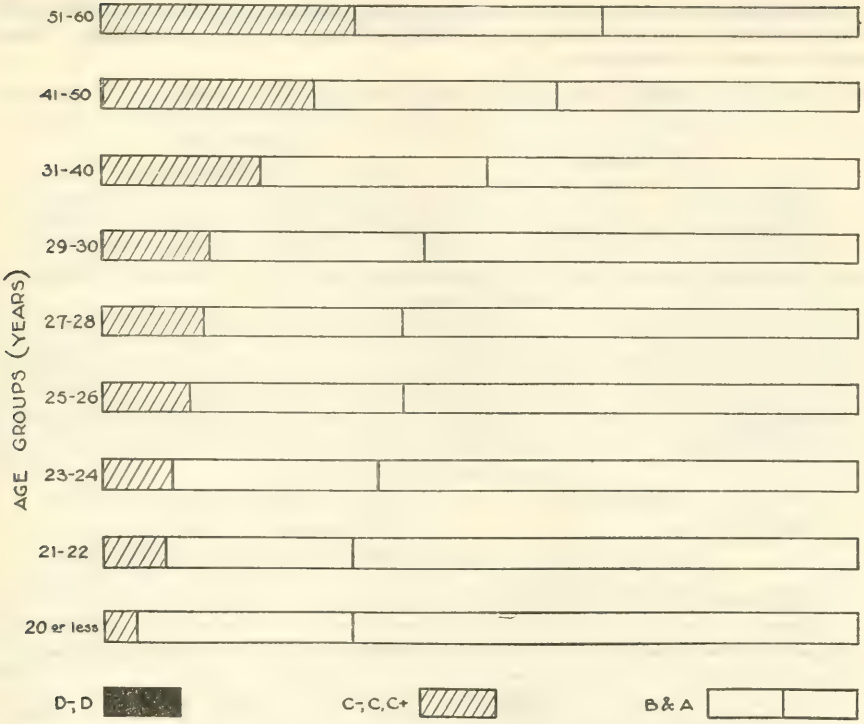


FIG. 56. Intelligence ratings and age. Percentage comparison of letter grades for different age groups of 15,385 white officers.

A study was made at Camp Dix of the relation between age and score (alpha) for officers. Three groups were compared—line officers, quartermaster officers, and medical officers. Table 367 indicates roughly the variation of score with change in age groups. The table shows a slight lowering of the score with increasing age. In the three age groups, line officers maintain their percentage for scores of 350 and above. Medical officers show increase in the number scoring above 350. All three branches give increases in numbers and percentages of those scoring below 250. However, the differences for the age groups are slight. The range (Q_3–Q_1) increases with increasing age. The general trend of the medians is downward with the higher ages.

TABLE 367.—*Relation of intelligence rating to age of 1,014 white officers, Camp Dix. Examination alpha.*

Statistical measurement.	Age group (years).								
	21–26			26–30			31 and above.		
	Line.	Quarter-master.	Medical.	Line.	Quarter-master.	Medical.	Line.	Quarter-master.	Medical.
First quartile	281	277	296	270	237	248	245	236	214
Median	306	304	268	301	275	259	285	281	259
Third quartile	325	332	295	324	305	301	324	320	297
Range: Q_3–Q_1	44	55	49	54	68	83	79	84	83
Per cent below score 250	11.5	18.5	28.6	14.1	37.5	42.1	27.5	34.9	46.6
Per cent above score 350	9.0	11.1	.....	8.0	6.0	1.5	10.0	2.3	2.3
Number of cases	332	27	21	199	32	65	184	44	131

Tables 368, 369, and 370 give comparisons of officer groups at Camps Taylor, Greenleaf, and Lee. In all cases there is a definite trend toward decreasing score with increasing age. These tables are based on examination *a*.

TABLE 368.—*Relation of intelligence ratings to age of 1,192 white officers, Camp Taylor. Median scores of examination a.*

Statistical measurement.	Age group (years).						
	20–24	25–29	30–34	35–39	40–44	45–49	50
Median	295	295	282	264	266	250	244
Number of cases	359	374	184	109	105	40	21

TABLE 369.—*Relation of intelligence rating to age of 5,742 medical officers, Camp Greenleaf. Median scores of examination a.*

2,475 MEDICAL OFFICERS OF DRAFT AGE.

Statistical measurement.	Age.									
	21	22	23	24	25	26	27	28	29	30
Median	232	273	269	273	277	267	265	266	261	258
Number of cases	11	52	132	241	303	376	361	352	338	309

3,267 OFFICERS OVER DRAFT AGE.

Statistical measurement.	Age group.												
	30–31	32–33	34–35	36–37	38–39	40–41	42–43	44–45	46–47	48–49	50–51	52–53	54–55
Median	254	259	262	252	255	255	246	235	242	237	223	214	212
Number of cases	582	330	257	301	301	305	279	241	219	172	131	82	63

TABLE 370.—*Relation of intelligence rating to age of 778 white officers, Camp Lee. Median scores of examination a.*

Age.	Number of cases.	Median.	Age.	Number of cases.	Median.
20–21	40	295	40–41	34	295
22–23	128	305	42–43	10	280
24–25	128	299	44–45	10	231
26–27	97	304	46–47	9	265
28–29	99	294	48–49	5	265
30–31	64	297	50–51	4	290
32–33	45	297	52–53	1	255
34–35	39	297	54–55	1	295
36–37	34	287	60–61	1	255
38–39	29	277			

Camp Devens reported the data from examination *a* that are summarized in table 371. Here the age distribution of medical officers (146 cases) is approximately normal. Its median is at 37 years. The median age of infantry officers is 25.4. Tetrachoric correlations of age with score gave -0.0107 for medical officers and $+0.12$ for infantry officers. The modes of the distributions for all officers and for the infantry group fall near age 25 with decidedly skewed distributions. The small number of cases in the higher age groups makes comparisons uncertain. Nevertheless, the drift is again in the direction of decreasing score with increasing age. If we accept the criterion that a difference between means which is three times its probable error is significant, we find that the age group 21–25 is superior to the group 26–30 or to any higher group. Above 35 years in these data there is no significant difference between age groups.

TABLE 371.—*Relation of intelligence ratings to age of 949 white officers, Camp Devens. Means and standard deviations with examination a.*

Arm.	Age groups.									
	21–25		26–30		31–35		36–60		21–60	
	Mean.	S. D.	Mean.	S. D.	Mean.	S. D.	Mean.	S. D.	Mean.	S. D.
Infantry	317.5	27.3	308.4	42.8	282.0	54.8	298.0	.. .	307.9	44.6
Artillery	329.8	37.6	323.5	37.6	291.6	41.4	239.2	.. .	319.1	42.9
Engineers	325.7	24.2	325.0	31.8	299.4	38.5	280.0	.....	308.3	43.0
Medical	298.7	42.2	288.8	48.3	295.5	40.3	273.6	.....	283.6	47.0
All officers	312.8	41.8	303.4	45.7	292.6	45.3	283.8	... ..	302.6	48.6
Number of cases	400		277		108		164		949	

Although the general trend toward decreasing score with increasing age can thus be unequivocally made out, the deviation of individual cases from the rule is very wide indeed. On the average older men score lower; but the chances that a particular older officer will make a lower score than a particular younger one are very little greater than that the reverse will be the case. The scatter of the cases is wide and the coefficients of correlation are correspondingly small. The following coefficients of correlation between age and score in examination *a* illustrate the point:

5,404 medical officers, Camp Greenleaf	−0.192
2,475 medical officers, Camp Greenleaf, 21–30 years	− .063 (P. E., 0.013)
3,267 medical officers, Camp Greenleaf, 30–60 years	− .192 (P. E., .011)
146 medical officers, Camp Devens	− .011
308 infantry officers, Camp Devens	− .120

The question arises as to whether this inverse relation of age and score begins at 21 years (the lowest age) or at some higher point. The general evidence of the data on officers is that with officers the decrease is continuous throughout the range of ages. The data of the principal sample in table 366 and the data from Camps Greenleaf and Devens in tables 369 and 371 all show a continuous trend between the years 21 and 30. Camps Dix, Taylor, and Lee (tables 367, 368, and 370) appear not to show a trend in either direction within these limits. There are certain meager data on enlisted men, who naturally fall between the ages of 20 and 31, which also fail to show any decrease of score with age. A report from Camp Lee gives for 594 white enlisted men the following median scores in examination *a:*

Age.	Number of cases.	Median.	Age.	Number of cases.	Median.
20–21	61	138	26–27	97	149
22–23	202	147	28–29	63	162
24–25	136	147	30–31	35	145

Camp Upton reports alpha scores of 600 white enlisted men for the two extreme age groups within the draft limits:

Statistical measurement.	Age group.	
	21–23	29–31
Mean	62.1	63.8
Median	56.4	61.8

Here there seems to be an increase, if anything. In a corresponding report from Camp Upton on 600 negro enlisted men there is a definite increase:

Statistical measurement.	Age group.	
	21–23	29–31
Mean	44.0	48.6
Median	34.8	40.5

These data are, however, scanty and quite possibly reflect in every case different principles of selection at work within the Army. At best we can say that a general trend for officers throughout the entire range is made out, but that this trend with officers or enlisted men may not be definite within the decade of the draft ages.

The distribution of ages for officers within the various branches of the service is interesting as affecting the comparison of these branches. Table 372 shows these distributions. Most frequently the medians fall in 27–28 group, where is the median for the group of officers taken as a whole (28.8). The Artillery officers are a little younger than the rest. The officers of the Field Signal battalions and of the Quartermaster Corps are slightly older. Officers in the Medical Corps are very much older. The median for this corps falls at 37.6 years, and more than three-quarters of the group are over 30 years old and slightly more than one-third over 40 years. This fact is of special interest in connection with the low rating of medical officers (see chap. 16). In the total group of officers a little more than one-third (38 per cent) are over 30 years of age.

TABLE 372.—*Age distribution of officers. Figures are percentile distributions for different arms of the service.*

Arm.	Age group (years).									Median age.	Number of cases.
	20 and less.	21–22	23–24	25–26	27–28	29–30	31–40	41–50	51–60		
Infantry	0.3	8.9	19.8	19.7	15.1	11.1	20.0	4.7	0.4	27.2	6,842
Artillery	.1	11.3	23.4	20.4	15.6	12.2	15.3	1.7	.....	26.5	1,507
Machine-gun battalions	.....	10.6	21.2	18.9	16.2	8.5	19.9	4.7	.....	26.9	493
Engineers	.1	6.7	16.9	17.2	16.0	12.2	25.6	4.5	.5	28.1	984
Field Signal Corps	.3	5.5	14.7	16.4	13.2	13.5	27.9	8.6	.3	29.0	350
Quartermaster Corps	.1	4.0	13.2	15.4	16.6	12.4	25.0	11.9	1.1	29.1	747
Medical Corps	.....	.....	2.2	4.8	7.3	8.1	42.0	30.1	5.6	37.6	3,090
Dental Corps	.....	3.9	16.8	25.0	16.8	14.2	17.2	6.0	.....	27.5	413
Veterinary Corps	.....	3.2	13.6	16.7	22.0	15.1	26.7	2.4	.4	28.5	251
All officers	.2	6.4	15.2	15.9	13.8	10.9	25.8	10.6	.1	28.8	15,385

CHAPTER 15.

INTELLIGENCE RATINGS OF OCCUPATIONAL GROUPS.

The relationship between intelligence as measured by the Army psychological examinations and various occupational groups was a by-product of the development of the Army psychological work. Serious study of this relationship was not attempted in the early months largely because the attention of the psychological examiners was not called to the possible uses of intelligence ratings in connection with the occupational classification and placement of men. A number of studies had been made, however, prior to the signing of the armistice and the indications are that they would have been carried still further had not the military situation changed so radically.

The first study reported was made at Camp Dix during October, 1917. It is concerned with the relationship between intelligence (examination *a*), skill (Stenquist skill test), wages (earnings prior to entering the Army), and nineteen occupations. Table 373 gives the 204 cases showing the relationship between average scores in intelligence and the nineteen reported occupations.

TABLE 373.—*Intelligence and occupation. Average scores in examination "a" according to occupation, Camp Dix, October, 1917, arranged in rank order.*

Occupation.	Number of cases.	Average score.	Occupation.	Number of cases.	Average score.
Stenographer	7	253	Shoe worker	5	146
Draftsman	5	250	Machinist	17	141
Salesman	6	209	Farmer	20	135
Bookkeeper	4	203	Chauffeur	25	120
Clerk	26	196	Teamster	10	95
Plumber and pipe fitter	8	191	Fireman	11	94
Engineer	4	167	Factory worker	10	57
Electrician	6	166	Laborer	25	40
Trainman	3	162			
Street railway operative	5	159	Total	204	.....
Carpenter	7	150			

It is obvious that the number of cases involved in the table is too small to justify positive conclusions regarding intelligence differences among various occupations. The average scores are also unreliable because no method was available for measuring the intelligence of foreigners and illiterates; any such cases included in the study were thus unfairly scored 0.

No attempt was made to interpret the possible uses of such a table beyond a suggestion that the many contradictions between intelligence scores and wages would enable the personnel officers to use intelligence scores as a partial guide in judging the ability of men; the assumption was that a wage-criterion of ability is unreliable.

The next study, reported from Camp Lee, was based upon 2,707 soldiers in the Three hundred and twentieth and Three hundred and eighteenth Regiments; 35 occupations were represented by more than ten cases each. The quartile values were not determined and the range of intelligence scores in any particular occupational group is therefore unknown. The average scores for the various occupations listed do not represent accurate measures of the mental ability of the representatives *in camp* (or elsewhere) of those occupations for the reason that they are based upon the performances of literate white men only (illiterates and foreigners are excluded from the study because no means was available at that time for measuring their intelligence). (See table 374.)

TABLE 374.—*Intelligence and occupation. Median scores in examination "a" according to occupation, Camp Lee, January, 1918, arranged in rank order.*

Occupation.	Number of cases.	Median score.	Occupation.	Number of cases.	Median score.
Teachers	16	273	Glass workers	29	140
Draftsman	15	255	Iron and sheet metal workers	113	140
Students	40	253	Inspectors	16	140
Accountants and bookkeepers	68	251	Railroad workers	172	139
Postal employees	10	233	Bakers	44	134
Salesman	118	222	Plasterers, carpenters, and bricklayers	91	131
Business executives	82	218	Linemen	11	130
Engineers	41	207	Structural workers	17	130
Clerical workers	333	205	Farmers	186	120
Electricians	73	197	Butchers	28	120
Artisans and actors	40	192	Cooks	57	117
Telephone and telegraph operators	20	184	Foundry and factory men	108	109
Chemical workers	12	180	Blacksmiths	20	100
Painters and pattern makers	76	163	Stewards and waiters	19	100
Merchants	69	163	Laborers	295	95
Plumbers	57	153	Barbers	26	85
Miners and machinists	255	148			
Firemen	21	147	Total	2,707	.....
Motor workers	129	141			

With the revision of examination methods and the extension of psychological examining to all camps a number of additional studies were reported and a standardized, coordinated study was made by a number of the camps under the direction of the Division of Psychology.

The necessity for using intelligence ratings in the occupational assignment and placement of men in the Army was brought sharply to the fore in the experience of the personnel and psychological officers at Camp Wadsworth. Here the personnel officer picked 20 clerical workers for special detail to the Psychological Board. Two facts immediately became apparent: About one-third of the men were inefficient and incompetent and the same one-third had intelligence ratings below C+. The attention of the personnel officer was called to this state of affairs and he agreed that successful placement of men involved the utilization of intelligence ratings. The realization of the need for occupational intelligence standards resulted in the following study:

The personnel adjutant made a list of 55 occupations which he considered to be of especial value to the Army. Upon the completion of the psychological examinations of the draft of May 25 to June 4, 1918, all record cards containing the alpha grades of literate white men were classified for 55 occupations. The scores or grades were tabulated, the number of cases in each occupation noted, and the first quartile, median, and third quartile scores calculated. Each occupation was ranked with all the other occupations according to the median scores. The results of this study are shown in table 375.

It will be noted that the occupations embracing unskilled laborers have the lowest median scores. Then come the occupations involving semiskilled labor. Next higher are the skilled trades. The technical trades are next, while the professional workers are the highest of all. It is to be expected that certain inconsistencies would appear in such a study. At that time the extremely low median score of 99 for printers was commented upon and interpreted as being due to the fact that many who called themselves printers were not really printers, but had merely been employed in one capacity or another in printing offices. Presumably this was true of many individuals in each occupational group. In the absence of reliable trade tests to classify men occupationally it was felt that the placement of men occupationally could be done with greater accuracy if the selection were made with reference to the median intelligence scores. For example, there are many soldiers who claim to have been clerical workers, but who are of inferior or very inferior intelligence. In order to avoid mistake in "placing" such individuals, the safe thing to do would be to select those soldiers who are above the median ability of their group.

TABLE 375.—*Intelligence and occupation. Median and quartile scores of white draft of May-June, 1918, in examination alpha, Camp Wadsworth, arranged in rank order. The median score for all drafted men is 121.*

Occupation.	Number of cases.	First quartile.	Median.	Third quartile.
Civil engineer	21	246	274	286
Lawyer and teacher	82	210	252	321
Student	42	170	239	280
Dentist and mechanic dentist	8	190	229	240
Draftsman	17	155	206	251
Chemist	15	160	205	270
Postal employee	53	162	200	226
Army	28	96	198	260
Mechanical engineer	12	123	195	265
Druggist	26	142	192	233
Traffic director and transportation	16	90	189	243
Clerks	1,111	123	175	224
Salesman	286	120	170	223
Surveyor	[illegible]	[illegible]	165	230
Telegraph and wireless operator	21	153	165	217
Photographer	22	102	159	207
Farmer	5	142	155	177
Drug clerk	16	88	149	180
Builder and constructor	83	72	149	230
Engineers	64	78	147	216
Aeroplane builder	18	55	140	202
Bugler	8	99	139	190
Mechanics	71	62	138	228
Gas engine mechanics	28	64	129	167
Telephone operator	42	94	127	169
Auto mechanics	139	86	122	163
Electrician	107	88	122	206
Hospital orderly	25	65	122	176
Musician	38	50	119	190
Foremen	24	68	119	180
Butcher	53	70	118	170
Plumber	112	80	117	158
Miscellaneous	1,778	64	117	175
Pipe fitter	77	62	116	153
Structural steel worker	28	75	109	170
Blacksmith	12	10	109	145
Gunsmith	20	75	109	140
Machinist	368	65	107	163
Bakers and cooks	99	60	106	155
Railroad workers	276	58	106	156
Chauffeurs	492	64	104	156
Painter	94	64	103	171
Printer	95	72	99	165
Lumberman	36	60	96	160
Carpenter	194	57	91	159
Millwright	8	60	89	130
Sheet-metal worker	72	54	88	132
Leather worker	64	55	88	122
Welder	8	36	85	166
Horseman	12	50	75	110
Canvas worker	7	55	75	165
Farmers	378	40	73	122
Teamster	248	42	72	95
Barber	42	32	65	125
Laborer	537	36	65	116
Total	[illegible]	[illegible]	[illegible]	[illegible]

The number of cases representative of most of the occupational groups is too small to give a reliable distribution of intelligence scores for those groups. The median and quartile scores are also unreliable because they are based upon literate whites only. The median and quartile scores are therefore more unreliable for those occupations having low scores, for it is those occupations that contain the largest proportion of foreign and native illiterates.

The question of definition of each occupational group has not been given the consideration that is necessary. Each individual represented in the tabulation classified himself in filling in the blank items on the psychological record card. It is evident that such occupational classification is very loose and is much less reliable than the classification arrived at through the personnel interview. The looseness and unsatisfactoriness of the procedure that was used is indicated by such general terms as "engineers," "railroad worker," and "clerks." This latter term included various kinds of clerks and even typists and stenographers.

It is evident that improvement in deriving a table of occupational intelligence standards would depend upon a more precise standard of occupation definition and classification, a great increase in the number of cases in each group, and a method of recording the intelligence scores that would include the scores of illiterate Americans and foreigners as well as literates.

Realizing the need for a reliable table of occupational intelligence standards, the Division of Psychology of the Surgeon General's Office undertook to direct the study in such a manner

as to avoid the statistical errors involved in the previous studies. Before presenting this investigation it may be of interest to note the results of the Camp Devens study, which is quite comparable to the Wadsworth study.

This study is based on the results of the alpha examination of the May, June, and July drafts of 1918 (literate whites). Fifty-seven occupations are presented, representing 15,122 men. The first quartile, median, and third quartile scores are given for each occupational group. The results are shown in table 376.

TABLE 376.—*Intelligence and occupation. Median and quartile scores of white drafts of May to July, 1918, in examination alpha, Camp Devens, arranged alphabetically by occupation.*

Occupation.	Number of cases.	First quartile.	Median.	Third quartile.
Accountant and auditor	75	197	223	292
Actor	26	91	151	211
Auto repairer	189	99	146	187
Baker	40	86	146	177
Barber	58	48	87	125
Blacksmith	29	56	87	115
Bookkeeper	227	200	244	281
Brakeman, railroad	33	84	120	159
Business men	238	117	173	219
Butcher	83	68	111	156
Carpenter	359	75	127	175
Chauffeur, mechanic	260	69	118	174
Chauffeur	583	81	120	167
Chemist	52	201	253	286
Clerks	1,438	135	186	235
Conductor	78	80	132	183
Cook	228	54	93	147
Dentist	28	157	195	261
Draftsman	30	198	231	263
Druggist	70	123	174	219
Electrician	174	109	162	214
Engineer, M. E. C	73	199	250	290
Engineer, steam	47	86	115	156
Executive	222	174	220	271
Farmer	2,017	57	97	153
Fireman, railroad	112	62	103	155
Fireman, stationary	123	52	87	159
Fisherman	49	49	79	139
Foreman	189	116	173	231
Inspector	65	105	161	205
Laborer, unskilled	2,436	47	87	140
Laborer, skilled	976	83	130	179
Lineman	58	66	115	162
Lumberman	301	67	115	166
Machinist	518	89	136	179
Mason	48	72	122	156
Mechanic	120	96	147	193
Musician	56	134	169	209
Operator and lineman	41	61	106	173
Painter	191	76	115	175
Plumber	228	87	129	168
Policeman and detective	26	111	139	204
Printer	128	118	162	212
Sailor	42	54	109	153
Salesman	564	125	172	219
Shoemaker	319	69	115	150
Station employee, railroad	52	81	151	206
Stenographer	38	197	253	279
Stock keeper	37	105	174	210
Student	161	192	246	279
Storekeeper	83	81	141	213
Tailor	34	44	85	111
Teachers	168	217	252	309
Teamster	792	57	95	142
Textile worker	349	63	103	161
Trainman, railroad	161	77	141	187
Total	15,122	.....	.....	.....

The number of cases representing most of the occupational groups is large enough to give reliable distributions of intelligence scores for those groups. The median and quartile scores, however, are unreliable because they are based upon literate whites only. No indication is given concerning the method of occupational definition and the method of classifying each case.

The chief interest of this study for the present report is the possibility of comparing it with the Wadsworth study in certain particulars. Unfortunately there are only 29 occupations common to both studies. These 29 occupations were ranked according to the median scores shown in the Wadsworth study and also as shown in the Devens study. These two rank orders were then compared. The Spearman R value equals $+0.71$, which corresponds to a Pearson r value of $+0.90$. This indicates that in general the relative rating of these 29 occupations according to intelligence is much the same in the Wadsworth study as in the Devens study. It is interesting to note that of these 29 occupations 23 had a higher median score in the Devens study than in the Wadsworth study and only 6 had a lower median score. The average difference in score is 16.3 points. The median score of the literate whites in the Wadsworth draft was 121. The median score of the literate whites in the Devens survey was 133. This is a difference of 12 points. It is probable that the higher median scores both for the occupational groups and for the general survey groups in Camp Devens as compared with Wadsworth groups was due to a slightly higher literacy standard in the former camp.

It was pointed out in discussing the Wadsworth study that in all probability the median score of 99 points for printers was unreliable. That this point of view was correct is indicated by the fact that the Devens printers have a median score of 162 points. This disagreement of 63 points for a given occupational group is the greatest disagreement that was found between the two studies.

The similarities found in the above comparisons indicate that these two occupational investigations are roughly accurate and justify themselves on practical grounds.

The interest shown by personnel officers in the Wadsworth study indicated that such a table of occupational intelligence ratings was of considerable practical value for Army personnel work. The Division of Psychology of the Surgeon General's Office planned a much more comprehensive study and sent out a letter to all chief psychological examiners requesting that score distributions for certain occupational groups be tabulated and reported to the Surgeon General's Office at the earliest possible moment. The letter requested data on 114 occupations, an urgent list of 69, and an additional list of 45. These occupations were designated by the Committee on Classification of Personnel for such special report. Instructions covering the method of securing and recording the data were also included in the letter. Effort was made to avoid the errors of the earlier studies. The question of precise standard of occupational definition and classification was solved by referring in each case to the soldier's qualification card. It was planned to secure enough cases in each occupational group to give reliable standards, and to insure this each examining station was requested to report on from 1,000 to 10,000 cases. Provision was also made to record both alpha and beta scores.

The work of assembling and analyzing the data was done by Dr. James W. Bridges in the Office of the Surgeon General, and was completed by September 1, 1918. At that time reports had been received from 16 camps, viz: Sherman, Sheridan, Lee, Greenleaf, Logan, Wheeler, Custer, Grant, Cody, Jackson, Dix, Travis, Pike, Gordon, Funston, and Taylor.

The report as made by Dr. Bridges is as follows:

After the data were tabulated and summarized, it was found that for many occupations there were too few cases to give a reliable range or central tendency. Upon the basis of reliability of results, the 114 occupations were grouped into five classes. Each class contains occupations for which there is a certain range of cases, and the steps from group to group represent equal decreases of reliability. The limiting numbers are roughly the squares of 16, 12, 9, and 6. The groups, range of cases, and number of occupations in each are as follows:

TABLE 377.—*Intelligence and occupation. Median and quartile scores in examination alpha of occupational groups in study by Surgeon General's Office.*

The number at the left is the classification number for the occupation assigned by the committee on classification of personnel.

T=Total. M=Median.
A=Apprentice. Q_1=First quartile.
J=Journeyman. Q_2=Second quartile.
E=Expert. No.=Number of cases.

GROUP A (250 OR MORE CASES).

	Occupation.		Alpha raw scores.				Beta weighted scores.				
			M	Q_1	Q_2	No.	M	Q_1	Q_2	No.	Per cent beta.
2f	Farmer, 6,886	T	48.3	29.6	72.9	5,126	81.1	57.6	119.2	1,760	25.56
		A	42.5	25.4	66.2	1,382	85.6	58.3	116.1	459	24.90
		J	49.7	31.0	74.1	3,559	79.0	57.4	120.5	1,268	26.30
		E	62.0	42.1	91.0	185	85.7	62.3	117.7	33	15.14
3	Laborer, 1,453	T	46.7	28.3	68.3	983	65.8	45.3	96.1	470	32.40
		A	41.7	23.3	64.3	479	57.9	39.8	89.3	265	35.60
		J	49.3	32.8	70.2	442	72.9	52.3	104.0	190	30.06
		E	56.7	37.6	77.3	62	87.0	65.7	99.0	15	19.50
6g	General machinist, 1,251	T	62.8	39.6	88.7	1,065	94.9	62.3	121.5	186	14.58
		A	60.7	37.4	85.8	285	94.0	57.2	127.9	57	16.67
		J	65.2	40.5	90.6	627	100.9	65.9	124.3	104	14.23
		E	59.0	39.0	85.7	153	82.3	59.0	105.7	25	14.05
6l	Lathe hand, 310	T	64.5	44.0	90.9	241	89.0	63.0	129.0	69	22.26
		A	58.1	37.2	78.2	95	75.7	59.0	119.0	21	18.10
		J	67.8	48.2	94.0	127	95.7	71.5	130.4	42	24.85
		E	75.7	56.5	105.7	19	69.0	49.0	139.0	6	24.00
7g	General blacksmith, 351	T	61.1	39.0	82.4	275	89.0	58.2	127.8	76	21.65
		A	65.4	40.3	85.7	99	96.5	69.0	144.0	20	16.81
		J	58.7	37.7	78.4	146	87.6	59.0	127.0	47	24.35
		E	64.0	50.4	87.0	30	89.0	52.3	119.0	9	23.08
8g	General carpenter, 792	T	59.8	39.7	83.7	657	105.3	77.2	133.7	135	17.05
		A	49.4	30.7	76.7	126	103.2	71.9	124.0	44	25.88
		J	60.4	41.7	84.0	433	105.1	79.7	137.8	80	15.58
		E	68.6	43.5	89.0	98	139.0	99.0	147.0	11	10.09
10g	General electrician, 499	T	80.8	56.5	108.7	482	147.0	119.0	179.0	17	3.41
		A	75.0	45.7	98.3	113	159.0	.....	.....	1	.88
		J	80.7	58.2	106.5	271	152.3	119.0	180.0	13	4.58
		E	89.0	63.6	119.0	98	139.0	.....	.....	3	2.97
12g	General miner, 852	T	48.9	39.7	71.1	595	80.2	52.8	107.6	257	30.16
		A	47.6	25.7	72.3	138	82.3	47.6	123.0	37	21.14
		J	50.1	31.5	71.5	396	79.8	54.0	106.4	182	31.49
		E	45.7	24.0	66.5	61	82.8	56.5	107.6	38	38.38
13	Painter, 648	T	58.7	37.5	80.5	531	116.4	65.7	128.4	117	18.05
		A	52.7	34.0	79.0	94	101.5	64.0	133.0	28	22.97
		J	60.6	37.1	81.5	350	99.0	64.0	125.0	71	16.82
		E	68.1	43.0	80.4	87	111.5	79.0	149.0	18	17.14
14p	Plumber, 270	T	66.2	44.3	87.4	224	111.2	76.5	136.8	46	17.04
		A	56.5	33.0	79.0	61	105.7	69.0	132.3	17	21.79
		J	67.9	46.5	87.1	143	116.5	82.3	141.5	24	14.37
		E	80.7	64.0	97.3	20	119.0	109.0	139.0	5	20.00
15b	Brakeman, 814	T	63.0	41.4	86.4	722	93.6	66.7	121.3	92	11.31
		A	67.4	41.3	88.6	207	104.0	85.7	119.0	25	10.75
		J	61.2	41.3	86.6	427	91.5	70.4	121.9	53	11.05
		E	60.2	43.1	81.8	88	84.0	52.3	122.3	14	13.72
17lf	Locomotive fireman, 734	T	60.9	43.6	84.0	629	92.3	63.3	121.4	105	14.30
		A	68.5	48.2	91.2	191	99.0	79.0	131.5	31	13.97
		J	57.4	39.5	77.3	333	92.3	67.6	119.0	49	12.83
		E	61.9	46.6	84.8	105	84.0	59.0	111.0	25	19.23
18r	Receiver and shipper, 371	T	78.1	54.0	107.9	360	96.5	79.0	135.7	14	3.74
		A	80.7	56.5	112.2	124	119.0	59.0	159.0	4	3.13
		J	75.0	50.4	101.7	205	95.7	79.0	139.0	10	4.65
		E	99.0	66.5	125.7	31	.....	.....	.....	.....	.....
18s	Stockkeeper, 412	T	77.9	55.5	104.9	398	91.5	74.0	119.0	14	3.40
		A	76.5	51.7	102.8	112	89.0	82.3	95.7	4	3.45
		J	78.1	59.0	104.3	243	109.0	69.0	129.0	9	3.57
		E	85.7	54.0	110.7	43	79.0	.....	.....	1	2.27
22a	Auto chauffeur, 2,754	T	64.7	42.6	91.6	2,447	103.2	73.2	125.4	307	11.14
		A	59.9	40.3	86.3	881	94.9	70.4	121.3	92	9.46
		J	66.7	43.7	95.1	1,373	109.3	79.9	135.8	196	12.49
		E	70.8	49.0	94.3	193	89.0	59.0	129.0	19	8.96
23t	Heavy truck chauffeur, 1,019	T	57.6	37.4	83.3	887	97.7	68.1	126.6	132	12.96
		A	54.0	33.8	78.4	259	100.7	66.5	124.6	40	13.38
		J	58.5	40.6	86.4	502	97.6	70.7	124.0	73	12.69
		E	62.8	43.6	82.8	126	99.0	69.0	144.0	19	13.10
24g	General auto repairman, 1,249	T	65.1	43.2	90.6	1,142	106.4	73.7	132.8	107	8.56
		A	59.6	39.0	87.6	317	95.7	65.7	129.0	26	7.58
		J	66.1	45.0	89.1	634	109.6	77.9	134.0	60	8.65
		E	72.8	46.1	100.6	191	99.0	82.3	134.0	21	9.90
25s	Stationary gas engineman, 293	T	54.5	34.5	80.9	236	116.5	99.0	133.1	57	19.45
		A	54.0	36.5	89.0	46	122.3	105.7	139.0	13	22.00
		J	53.0	33.6	76.3	173	113.6	96.5	131.7	42	19.53
		E	84.0	62.3	109.0	17	189.0	.....	.....	2	10.50
27h	Horse hostler, 1,021	T	54.6	35.1	76.8	723	69.8	43.9	100.1	298	29.18
		A	47.3	31.0	72.4	272	73.8	44.3	105.3	118	4 30.26
		J	57.9	38.6	78.4	364	69.3	39.5	99.0	151	29.32
		E	55.4	37.9	81.9	87	59.0	39.0	84.0	29	25.00
27t	Teamster, 2,730	T	49.7	30.2	72.3	2,019	74.5	47.2	102.8	711	26.05
		A	51.6	31.3	74.4	1,026	77.0	52.1	104.4	338	24.78
		J	48.5	29.6	70.9	898	70.9	44.5	102.1	338	27.35
		E	44.8	29.7	58.4	95	79.0	39.0	99.0	35	26.92

TABLE 377.—*Intelligence and occupation. Median and quartile scores in examination alpha of occupational groups in study by Surgeon General's Office*—Continued.

GROUP A (250 OR MORE CASES).

	Occupation.		Alpha raw scores.				Beta weighted scores.				
			M	Q_1	Q_3	No.	M	Q_1	Q_3	No.	Per cent beta.
27tr	Horse trainer, 271	T	56.6	38.5	77.1	221	104.6	71.5	129.0	50	18.45
		A	53.3	37.3	72.3	81	96.5	63.0	123.0	30	25.20
		J	59.0	39.0	77.1	109	121.0	89.0	144.0	20	15.50
		E	72.3	50.7	99.0	24	.....	.....	.....	.....	.....
31t	Telegrapher, 261	T	84.8	61.4	109.8	255	114.0	99.0	139.0	6	2.30
		A	89.7	65.3	107.3	36	139.0	.....	.....	1	2.70
		J	83.0	59.5	110.1	165	119.0	.....	.....	3	1.78
		E	90.5	69.0	111.5	54	109.0	.....	.....	2	3.57
32t	Telegraph and phone lineman, 313	T	63.8	42.8	87.6	271	79.0	65.7	90.4	39	12.46
		A	62.8	40.8	92.3	93	82.3	39.0	99.0	10	9.71
		J	62.8	43.4	84.4	149	109.0	74.0	130.4	27	15.34
		E	75.3	41.5	96.5	32	119.0	.....	.....	2	5.88
38b	Bookkeeper, 458	T	100.9	76.8	126.6	450	149.0	69.0	171.0	8	1.96
		A	94.0	64.6	125.7	78	169.0	.....	.....	2	2.50
		J	101.6	78.3	126.5	306	79.0	.....	.....	5	1.90
		E	106.0	86.5	129.0	66	139.0	.....	.....	1	1.49
38g	General clerk, 1,589	T	95.8	73.7	121.3	1,565	110.7	86.5	142.3	24	1.51
		A	91.4	64.1	114.6	402	112.3	59.0	139.0	13	3.13
		J	96.9	75.8	122.7	1,011	112.3	92.3	149.0	11	1.07
		E	102.0	84.7	129.3	152	.....	.....	.....	.....	.....
38rr	Railroad clerk, 308	T	91.4	68.7	114.7	303	119.0	.....	.....	5	1.62
		A	84.6	64.6	117.0	77	79.0	.....	.....	2	2.53
		J	92.0	69.5	118.0	191	119.0	.....	.....	3	1.55
		E	99.0	76.5	124.0	35	.....	.....	.....	.....	.....
39	Stenographer and typist, 402	T	115.0	92.6	138.0	400	169.0	.....	.....	2	.50
		A	114.9	97.3	136.5	76	179.0	.....	.....	1	1.29
		J	116.0	94.3	140.1	253	119.0	.....	.....	1	.39
		E	113.0	89.0	135.0	71	.....	.....	.....	.....	.....
40b	Baker, 379	T	58.7	40.0	87.1	294	87.9	60.4	113.7	85	22.43
		A	55.3	42.3	83.3	65	89.7	62.3	99.0	22	25.29
		J	58.8	39.2	96.8	170	91.2	59.0	115.0	46	21.29
		E	67.9	42.3	94.0	59	99.0	69.0	125.7	17	22.37
40c	Cook, 435	T	59.0	40.3	82.9	311	83.3	57.8	113.0	124	28.51
		A	53.0	35.7	77.9	99	75.3	51.5	105.7	38	27.71
		J	65.7	43.0	84.3	177	83.5	76.6	114.8	72	28.91
		E	62.3	41.0	91.5	35	104.0	84.0	129.0	14	28.57
41	Butcher, 444	T	61.4	40.4	85.1	370	94.0	63.0	119.0	74	16.70
		A	62.8	40.4	87.0	75	100.4	84.0	114.7	20	21.10
		J	60.1	40.5	83.8	241	89.0	61.2	129.0	43	15.15
		E	65.9	44.0	91.5	54	99.0	49.0	139.0	11	16.90
44b	Band musician, 308	T	81.9	56.7	108.2	289	99.0	72.3	129.0	19	6.17
		A	87.3	59.0	111.5	71	109.0	89.0	139.0	6	7.79
		J	84.3	63.1	110.9	156	105.7	79.0	139.0	11	6.59
		E	69.8	50.7	101.0	62	69.0	.....	.....	2	3.13
45	Barber, 377	T	54.6	33.6	77.9	275	82.2	54.6	107.8	102	27.10
		A	59.0	32.3	99.0	33	54.0	44.0	99.0	9	21.40
		J	55.9	34.3	77.6	176	84.5	59.0	109.0	87	32.81
		E	51.5	34.0	77.3	66	79.0	39.0	109.0	73	9.59

GROUP B (140–250 CASES).

7h	Horseshoer, 212	T	51.9	32.5	74.2	169	79.0	56.5	111.0	43	20.28
		A	40.7	31.2	59.0	30	94.0	.....	.....	4	11.76
		J	56.3	34.8	75.8	121	74.6	53.3	109.0	35	22.44
		E	45.3	29.0	74.0	18	119.0	.....	.....	4	18.18
8br	Bridge carpenter, 155	T	64.8	37.9	83.6	128	79.0	45.7	112.3	27	17.42
		A	65.0	45.0	79.0	47	69.0	56.5	89.0	12	20.34
		J	65.7	35.7	86.5	73	105.7	59.0	129.0	13	15.12
		E	71.5	56.5	86.5	8	69.0	.....	.....	2	29.00
12dr	Mine drill runner, 146	T	59.0	39.6	83.4	89	75.7	52.3	114.0	57	39.04
		A	59.0	31.5	69.0	17	63.0	44.0	79.0	15	46.88
		J	60.7	34.0	81.5	44	84.0	54.5	119.0	35	44.30
		E	61.5	41.5	86.5	28	119.0	59.0	129.0	7	20.00
9	Concrete or cement worker, 193	T	58.2	36.8	84.8	118	79.0	54.3	111.5	75	38.86
		A	58.3	31.0	84.0	32	66.5	46.5	99.0	26	44.8
		J	59.0	35.7	84.0	77	85.7	63.4	115.0	41	31.8
		E	71.0	69.0	99.0	9	89.0	61.0	139.0	8	47.0
14g	General pipe fitter, 218	T	65.2	42.2	87.9	190	91.0	66.5	129.0	28	12.84
		A	65.7	41.9	79.0	49	92.3	39.0	159.0	11	18.33
		J	62.9	40.7	85.4	114	104.0	79.0	129.0	15	11.63
		E	84.0	47.0	97.3	27	69.0	.....	.....	2	6.90
22m	Motor cyclist, 234	T	63.4	45.7	87.8	195	121.0	87.6	141.5	39	18.67
		A	60.5	44.8	80.4	85	124.0	89.0	145.7	17	16.67
		J	66.5	46.5	99.0	103	122.7	99.0	139.0	21	16.94
		E	79.0	51.0	99.0	7	99.0	.....	.....	1	12.50
24a	Auto assembler, 209	T	68.1	50.9	96.8	190	79.0	52.3	119.0	19	9.09
		A	56.5	39.0	94.0	54	109.0	.....	.....	5	8.48
		J	72.3	56.9	100.3	106	69.0	51.0	119.0	13	10.92
		E	79.8	52.3	95.7	30	99.0	.....	.....	1	3.23
24e	Auto engine mechanic, 174	T	66.4	45.1	89.0	166	134.0	114.0	164.0	8	4.60
		A	66.5	46.5	99.0	26	119.0	.....	.....	2	7.14
		J	67.8	45.0	90.4	122	139.0	.....	.....	5	3.94
		E	64.0	46.5	84.0	18	139.0	.....	.....	1	5.26
26	Bricklayer, 207	T	57.9	36.7	88.1	157	74.8	49.0	104.7	50	21.15
		A	47.3	22.0	67.3	24	79.0	44.0	101.0	8	25.00
		J	60.0	37.2	93.0	99	73.0	49.6	104.0	35	26.17
		E	66.5	45.0	91.5	34	99.0	69.0	129.0	7	17.07

TABLE 377.—*Intelligence and occupation. Median and quartile scores in examination alpha of occupational groups in study by Surgeon General's Office*—Continued.

GROUP B (140–250 CASES)—Continued.

	Occupation.		Alpha raw scores.				Beta weighted scores.				
			M	Q_1	Q_2	No.	M	Q_1	Q_2	No.	Per cent beta.
37	Accountant, 202	T	117.9	98.2	136.3	201	199.0	.....	.....	1	.50
		A	119.0	104.0	139.0	25	199.0	.....	.....	1	3.84
		J	120.3	99.0	136.4	131	.....	.....	.....	.....	.....
		E	113.3	95.7	134.0	45	.....	.....	.....	.....	.....
47c	Cobbler, 195	T	56.3	38.2	75.5	107	87.5	60.7	115.1	88	45.11
		A	49.0	31.5	84.0	27	90.7	65.7	114.0	22	44.89
		J	60.7	43.0	75.7	67	87.5	60.5	115.9	61	47.66
		E	59.0	44.0	69.0	13	79.0	.....	.....	5	27.78
48	Tailor, 239	T	53.3	32.0	85.7	143	77.0	57.1	112.8	96	40.17
		A	54.0	32.6	90.0	40	71.5	51.0	91.0	26	39.39
		J	47.8	30.3	72.0	84	79.0	60.2	121.0	63	42.86
		E	89.0	65.7	109.0	19	92.3	59.0	129.0	7	26.92
63g	General boiler maker, 153	T	51.0	31.0	74.0	119	109.0	69.0	133.0	34	22.23
		A	37.6	26.1	69.0	33	114.0	79.0	135.0	14	29.79
		J	49.0	32.1	73.0	73	92.3	49.0	139.0	15	17.05
		E	65.0	59.0	84.0	13	129.0	.....	.....	5	27.78
6mc	General mechanic (handy man), 138	T	68.5	48.2	94.0	116	101.5	59.0	127.0	22	15.94
		A	61.5	39.0	86.1	43	89.0	52.3	129.0	11	20.35
		J	71.5	49.0	96.5	65	105.7	79.0	119.0	9	12.15
		E	99.0	74.0	121.5	8	139.0	.....	.....	2	20.00

GROUP C (80–140 CASES).

15C	Railroad conductor, 92	T	64.0	46.0	83.0	85	99.0	72.3	119.0	7	7.61
		A	57.3	41.5	69.0	31	69.0	.....	.....	4	11.43
		J	69.7	47.0	94.0	42	109.0	.....	.....	3	6.67
		E	74.0	56.5	99.0	12	.....	.....	.....	.....	.....
18c	Stock checker, 108	T	69.8	43.6	94.0	101	119.0	89.0	139.0	7	6.49
		A	71.5	39.0	101.5	41	99.0	66.5	119.0	5	10.87
		J	68.5	49.0	86.5	54	179.0	.....	.....	2	3.57
		E	76.5	69.0	109.0	6	.....	.....	.....	.....	.....
34	Photographer, 94	T	85.7	55.3	107.0	83	112.3	89.0	129.0	11	11.70
		A	92.3	59.0	119.0	17	124.0	.....	.....	4	19.05
		J	81.9	55.0	103.4	55	109.0	79.0	129.0	7	11.29
		E	99.0	29.0	159.0	11	.....	.....	.....	.....	.....
40ca	Caterer, 108	T	57.3	40.8	89.0	77	79.0	54.0	96.8	31	28.70
		A	56.5	42.0	86.5	20	86.5	69.0	99.0	10	33.33
		J	72.3	51.9	112.3	37	66.5	49.0	99.0	14	27.45
		E	45.3	24.0	71.5	20	89.0	59.0	99.0	7	25.93
82	Detective and policeman, 107	T	69.3	45.9	90.4	102	59.0	.....	.....	5	4.77
		A	77.3	44.0	96.0	24	59.0	.....	.....	2	7.69
		J	69.0	47.9	87.0	69	59.0	.....	.....	2	2.82
		E	64.0	49.0	89.0	9	39.0	.....	.....	1	10.00
6me	Mechanical engineer, 45	T	109.7	72.8	137.3	40	79.0	.....	.....	5	11.11
		A	96.5	74.0	154.0	8	74.0	.....	.....	2	20.00
		J	110.3	75.7	134.0	22	139.0	.....	.....	3	12.00
		E	116.5	69.0	149.0	10	.....	.....	.....	.....	.....
6rs	Railroad shop mechanic, 74	T	60.0	34.0	94.0	58	89.0	62.3	121.5	16	21.60
		A	50.7	36.5	66.5	16	89.0	72.3	129.0	6	27.27
		J	64.0	31.0	92.3	27	69.0	49.0	109.0	8	22.86
		E	84.0	39.0	99.0	15	109.0	.....	.....	2	11.76
6tr	Tool-room expert, 41	T	67.3	49.6	92.0	40	114.0	.....	.....	4	9.09
		A	59.0	49.0	95.7	9	119.0	.....	.....	1	10.00
		J	64.0	39.0	89.0	11	109.0	.....	.....	2	15.38
		E	74.0	53.8	94.0	20	139.0	.....	.....	1	4.76
8s	Ship carpenter, 52	T	69.0	49.0	95.0	49	139.0	.....	.....	3	5.77
		A	54.0	35.3	119.0	12	.....	.....	.....	.....	.....
		J	70.0	53.2	92.8	32	139.0	.....	.....	3	8.57
		E	89.0	.....	.....	5	.....	.....	.....	.....	.....
11	Gunsmith	T	66.0	49.0	86.1	57	119.0	79.0	132.3	9	13.64
		A	65.0	49.0	84.0	33	99.0	59.0	129.0	7	17.50
		J	69.0	49.0	89.0	19	149.0	.....	.....	2	9.52
		E	69.0	.....	.....	5	.....	.....	.....	.....	.....
6tc	Tool and gauge maker, 79	T	65.7	43.3	91.0	71	129.0	109.0	149.0	8	10.13
		A	86.5	49.0	119.0	18	149.0	.....	.....	2	10.00
		J	63.5	41.5	79.0	42	139.0	.....	.....	3	6.67
		E	65.7	39.0	99.0	11	119.0	.....	.....	3	21.43

TABLE 377.—*Intelligence and occupation. Median and quartile scores in examination alpha of occupational groups in study by Surgeon General's Office*—Continued.

GROUP D (45–80 CASES).

	Occupation.		Alpha raw scores.				Beta weighted score.				
			M	Q_1	Q_2	No.	M	Q_1	Q_2	No.	Per cent beta.
171le	Locomotive engineer, 55	T	64.0	42.9	79.8	48	72.3	59.0	109.0	7	12.73
		A	39.0	29.0	84.0	11					
		J	57.3	44.0	76.0	28	69.0			5	15.15
		E	79.0	72.3	85.7	9	109.0			2	18.18
17me	Marine engineman, 47	T	67.8	46.5	89.0	38	89.0	79.0	99.0	9	19.14
		A	54.0			4	99.0			1	20.00
		J	65.3	49.0	82.3	26	89.0	69.0	109.0	8	23.53
		E	91.5	74.0	124.0	8					
21rh	Hand riveter, 56	T	67.8	41.5	85.7	46	104.0	69.0	129.0	10	17.86
		A	70.7	49.0	99.0	14	129.0			2	12.50
		J	61.5	37.3	77.8	20	109.0			4	16.67
		E	86.5	54.0	107.3	12	89.0			4	25.00
23tm	Truckmaster, 61	T	73.4	46.5	87.8	47	149.0	129.0	164.0	14	22.95
		A	51.5	36.5	79.0	14	169.0			2	12.50
		J	78.5	62.3	87.3	26	145.5	124.0	162.3	12	31.58
		E	89.0	44.0	109.0	7					
28	Farrier and veterinarian, 63	T	72.8	49.0	99.0	59	94.0			4	6.35
		A	89.0	69.0	122.3	15					
		J	59.0	42.3	89.0	29	94.0			4	12.12
		E	75.7	59.0	109.0	15					
29m	Mechanical draftsman, 58	T	114.0	84.0	139.0	55	99.0			3	5.17
		A	134.0	84.0	154.0	8					
		J	115.7	100.3	135.0	37	99.0			3	7.50
		E	111.5	89.0	129.0	10					
330	Telephone operator, 55	T	69.8	57.2	109.0	54	119.0			1	1.82
		A	71.5	56.9	97.3	20					
		J	69.0	54.0	99.0	29	119.0			1	3.33
		E	79.0			5					
38f	Filing clerk, 55	T	96.8	74.0	125.7	53	129.0			2	3.64
		A	99.0			3	79.0			1	25.00
		J	95.3	75.7	124.0	41	179.0			1	2.38
		E	119.0	59.0	139.0	9					
50c	Concrete construction foreman, 57	T	80.4	51.9	114.0	53	129.0			4	7.01
		A	84.0	56.5	121.5	8	159.0			1	11.11
		J	65.7	42.3	109.0	33	79.0			3	8.33
		E	96.5	81.5	134.0	12					
75	Laundryman, 51	T	66.5	41.0	85.7	37	94.0	49.0	124.0	14	27.45
		A	69.0	19.0	99.0	13	89.0	49.0	125.7	10	43.48
		J	66.5	45.0	77.0	18	129.0			2	10.00
		E	74.0	39.0	129.0	6	109.0			2	25.00
105	Civil engineer, 58	T	116.8	99.0	143.3	53					
		A	151.5			4					
		J	116.0	87.3	144.8	36					
		E	116.5	109.0	129.0	13					

GROUPS, RANGE OF CASES, AND NUMBER OF OCCUPATIONS.

Group.	Range of cases.	Number of occupations.
A	250	32
B	140–250	13
C	80–140	7
D	45–80	16
E	0–45	46

Groups A, B, C, and D were considered separately, but no further study was made of the 46 occupations in Group E. Additional data on these are needed, and it would seem desirable also to obtain further reports on Groups C and D.

The data for the 68 occupations of Groups A, B, C, D are summarized in table 378. The median and quartile scores are given for the alpha cases and for the beta cases of each occupation, and for apprentices, journeymen, and experts separately. The occupations within each group are arranged in the order of the symbols used by the committee on classification of personnel.

In order to render the data of table 377 more usable, the percentage receiving each letter grade was determined for each occupation. In doing this apprentices, journeymen, and experts were combined, for the differences were not as a rule significant, and the classification was made for the most part on the basis of personnel interview and not by means of trade tests.

Both alpha and beta numerical scores were converted into letter grades on the present basis (Aug. 8, 1918). These letter ratings were then combined, and the percentage receiving each grade as well as the percentage distributions were calculated. The percentage distributions are given in table 378.

TABLE 378.—*Intelligence and occupation. Percentage distribution of letter grades of occupational groups in study by Surgeon General's Office. Based on same data as table 377, q. v.*

GROUP A (250-).

	Occupation.	Letter grades.							Per cent beta.
		A.	B.	C+.	C.	C−.	D.	D−.	
2f	Farmer	1.9	5.2	12.6	26.4	26.8	20.6	6.4	25.6
3	Laborer	.62	3.5	10.7	24.2	25.1	24.6	11.4	32.4
6g	General machinist	3.1	9.3	21.2	29.2	22.7	10.8	4.1	14.9
6l	Lathe hand	3.2	10.0	18.1	32.3	18.4	13.9	4.2	22.4
7g	General blacksmith	1.7	8.2	18.8	31.3	20.5	13.9	5.4	21.6
8g	General carpenter	1.9	7.6	20.7	31.9	24.1	10.5	3.3	17.0
10g	General electrician	9.8	18.2	27.7	28.4	10.4	3.8	1.6	3.4
12g	General miner	.9	4.1	11.7	26.7	26.4	20.3	9.7	30.2
13	Painter	1.5	7.7	18.2	33.0	22.5	12.2	4.8	18.0
14p	Plumber	2.6	9.2	23.7	31.9	20.4	9.6	2.6	17.0
15b	Brakeman	2.4	8.8	22.5	32.0	22.5	9.2	7.5	11.3
17lf	Locomotive fireman	1.9	7.1	21.1	36.4	21.5	9.0	3.0	14.3
18r	Receiver and shipper	8.5	17.6	25.9	29.1	14.4	3.5	.8	3.7
18s	Stock keeper	5.6	19.2	28.6	29.6	12.1	3.6	1.2	3.4
22a	Auto chauffeur	4.1	10.2	22.5	31.3	21.0	8.5	2.3	11.1
23t	Heavy truck driver	2.6	8.3	18.2	32.6	24.2	11.0	3.1	12.9
24g	General auto repairman	2.8	10.6	25.1	31.7	21.2	6.7	1.9	8.5
25s	Stationary gas engineman	2.0	8.5	15.7	30.0	30.7	10.2	2.7	19.5
27h	Horse hostler	2.1	4.5	13.9	27.0	24.3	19.4	8.8	29.2
27t	Teamster	1.3	4.3	12.5	27.9	24.9	19.7	9.4	26.04
27tr	Horse trainer	1.8	5.2	18.4	34.7	24.0	11.8	4.1	18.5
31t	Telegrapher	7.3	20.3	32.2	29.1	10.0	1.2	.....	2.3
32t	Telegraph and telephone lineman	3.8	8.9	20.8	33.9	21.7	8.0	2.9	12.5
35b	Bookkeeper	18.1	28.6	29.9	17.9	4.4	.9	.2	1.8
38g	General clerk	15.3	25.0	33.6	19.7	5.2	.9	.3	1.5
38r	Railroad clerk	12.0	24.7	31.5	23.7	6.8	1.0	.3	1.6
39	Stenographer and typist	28.1	34.3	27.1	8.7	1.7	.....	.....	.5
40b	Baker	2.4	8.7	17.7	29.5	22.4	13.7	5.5	22.4
40c	Cook	.7	7.3	17.9	29.0	22.1	16.8	6.2	28.5
41	Butcher	1.1	8.3	21.6	31.8	22.8	11.3	3.1	16.7
44b	Band musician	8.8	18.5	28.6	26.3	12.3	4.5	1.0	6.2
45	Barber	.8	6.1	14.9	26.3	26.5	18.8	6.6	27.1

GROUP B (140–250).

7h	Horseshoer	0.5	5.2	15.1	29.7	25.0	17.5	7.1	20.3
8br	Bridge carpenter	1.3	6.4	23.2	28.4	20.6	14.2	5.8	17.4
9	Concrete and cement worker	.5	6.7	15.0	25.4	20.2	25.9	6.2	38.9
12dr	Mine-drill runner	2.1	6.2	14.4	24.0	21.9	26.0	5.5	39.0
14g	General pipefitter	2.3	7.8	26.1	29.8	23.4	7.8	2.8	12.8
22m	Motor cyclist	3.4	10.3	18.8	38.0	19.2	7.7	2.6	16.7
24a	Auto assembler	5.7	12.9	23.0	33.0	15.3	8.6	1.4	9.1
24e	Auto engine mechanic	4.0	11.5	24.7	35.1	20.7	2.9	1.2	4.6
26	Bricklayer	2.9	8.2	15.9	25.6	21.3	16.4	9.7	24.1
37	Accountant	28.7	39.1	26.2	5.5	.5	.....	.....	.5
47c	Cobbler	1.0	3.6	13.3	25.1	27.7	22.6	6.7	45.1
48	Tailor	1.7	4.6	14.2	20.9	24.7	25.5	8.4	40.2
63g	General boiler maker	2.0	7.2	11.8	29.4	29.4	14.4	5.9	22.2

GROUP C (80–140).

6cm	General mechanic	.....	14.5	24.6	28.3	16.7	11.6	4.3	15.9
6to	Tool and gauge maker	1.3	12.6	19.0	38.0	20.2	5.1	3.8	10.1
15c	Railroad conductor	.....	10.9	20.6	39.1	19.6	8.7	1.1	7.6
18c	Stock checker	6.5	11.1	25.0	29.6	21.3	4.6	1.8	6.5
34	Photographer	10.6	13.8	29.8	24.5	14.9	6.4	.....	11.7
40cs	Caterer	2.8	9.3	13.9	25.9	20.4	23.1	4.6	28.7
82	Detective and policeman	.9	9.3	29.9	33.6	16.8	5.6	3.7	4.8

GROUP D (45–80).

6me	Mechanical engineer	22.2	24.4	17.8	22.2	4.4	8.9	.....	11.1
6rs	Railroad shop mechanic	2.7	8.1	18.9	21.6	27.1	16.2	5.4	21.6
6tr	Tool-room expert	2.3	6.8	29.5	34.1	20.5	6.8	.....	9.1
8s	Ship carpenter	3.8	11.5	26.9	34.6	21.2	1.9	.....	5.8
11	Gunsmith	1.5	9.1	22.7	39.4	21.2	4.6	1.5	13.6
17le	Locomotive engineman	.....	3.6	27.3	32.7	21.8	12.7	1.8	12.7
17me	Marine engineman	2.1	8.5	21.3	29.8	25.6	8.5	4.3	19.1
21rh	Hand riveter	1.8	7.1	26.8	26.8	23.2	12.5	1.8	17.9
23tm	Truckmaster	.....	9.8	36.1	29.5	22.9	1.6	.....	22.9
28	Farrier and veterinarian	1.6	19.1	23.8	30.2	20.6	4.8	.....	6.3
29m	Mechanical draftsman	24.1	34.5	17.2	13.8	8.6	1.7	.....	5.2
33c	Telephone operator	.....	20.0	23.6	47.3	7.3	1.8	.....	1.8
38f	Filing clerk	16.4	23.6	32.7	23.6	.....	3.6	.....	3.6
50c	Concrete construction foreman	12.3	15.8	22.8	26.3	15.8	5.3	1.8	7.0
75	Laundryman	.....	11.8	15.7	27.5	21.6	13.7	9.8	27.5
105	Civil engineer	34.0	34.0	18.9	9.4	1.9	1.9	.....	.....

Special group for purpose of comparison with occupational groups in Depot Brigade.

Occupation.	A.	B.	C+.	C.	C−.	D.	D−.	Per cent beta.	Number of cases.
Army nurse	17.6	26.9	34.4	17.7	3.1	.2	.....	.....	453
Army chaplain	65.5	24.5	8.4	1.5	.....	.....	.....	.....	261
Young Men's Christian Association secretary	40.4	30.9	19.2	8.0	1.6	.....	.....	.....	188
Dental officer	17.7	36.7	26.6	19.0	.....	.....	.....	.....	79
Medical officer	40.7	36.8	18.6	3.1	.88	.....	.....	.....	457
Engineer officer	79.6	16.3	3.6	.4	.....	.....	.....	.....	879

In order to obtain a more direct comparison of the intelligence requirements of the occupations a composite graph (Fig. 57) was prepared. This shows the median and range of the middle 50 per cent for each occupation. In this graph the occupations are arranged in order from inferior to superior based upon the position of the median score in the letter-grade intervals, irrespective of the number of cases from which the median was calculated. The position of the median and quartile scores were computed from the percentage distributions of letter grades.

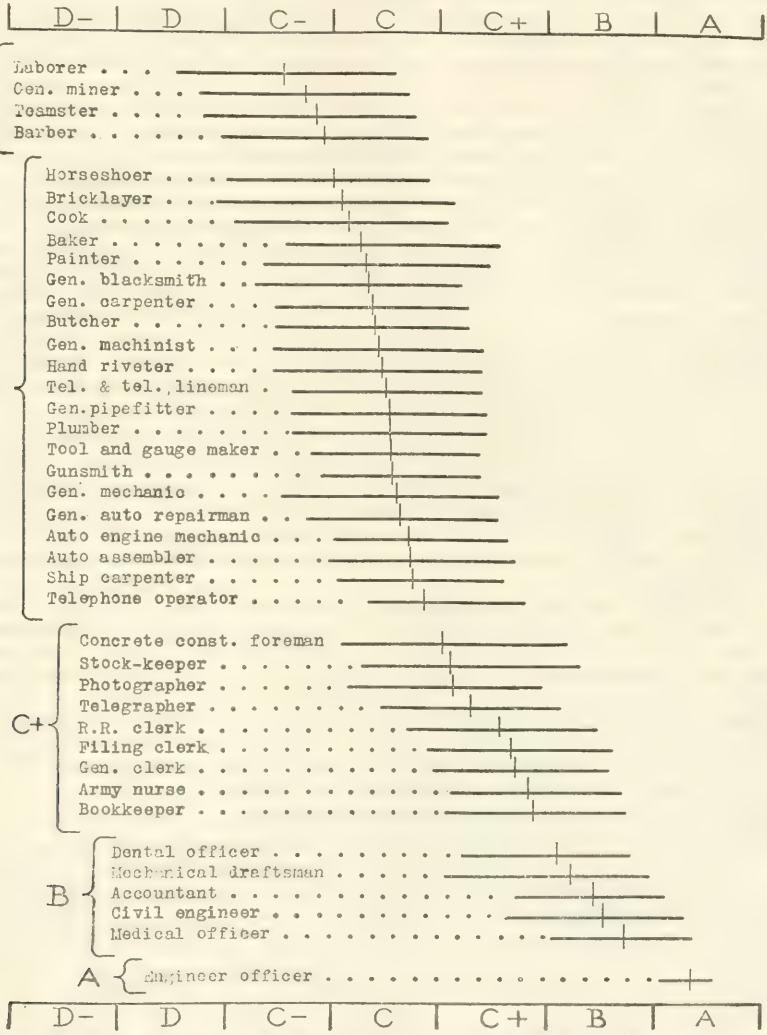


FIG. 57. Occupational Intelligence Ratings. (Cf. table 358.) Letter-grades on horizontal scale. Length of bar for each occupation is midrange of 50 per cent (distance between first and third quartiles), median point is shown by a crossline. Classification is that of Committee on Classification of Personnel.

Before attempting to evaluate the significance of the data presented in the above tables it would be well to consider carefully some general criticisms of the work. The significance of these data is limited because of two general difficulties inherent in the Army situation at the time the data were gathered. In the first place, the data are representative of draft quotas only and the nature of draft quotas is dependent upon the selective factors at work to produce them. In the second place, the accuracy of the data for any occupational group is dependent upon the accuracy of the personnel methods then operative in classifying recruits occupationally and in differentiating between levels of skill or expertness. These two general criticisms will be discussed in order.

It must be borne in mind that draft quotas arrived in camps in accordance with the operation of the selective service act. Only those between 21 and 31 were registered prior to September, 1918. More than seven-tenths of those registering were placed in the deferred classes. Provision was made to place in deferred classes (1) necessary skilled farm or industrial laborers in essential agricultural or industrial enterprises, (2) highly trained firemen or policemen in service of municipality, (3) necessary assistant, associate, or hired manager of essential agricultural enterprise, (4) necessary highly specialized technical or mechanical expert of essential industrial enterprise, (5) necessary assistant or associate or sole manager of essential industrial enterprise, (6) all legislative, executive, or judicial officers of the United States, or of State, Territory, or District of Columbia, (7) ministers or students of religion, and all necessary employees in the service of the United States, necessary customhouse clerks, necessary employees in the transmission of mails, and mariners and licensed pilots. In addition to the above deferments for occupational, industrial, and religious reasons we have seven different conditions of dependency involving varying degrees of deferment.

Of the 6,973,270 total deferments and exemptions we find 473,892 or 6.8 per cent who were given deferred classification because of occupational and industrial reasons; 34,740 or 0.5 per cent because of religious reasons; 3,559,099, or 51.1 per cent, because of various conditions of dependency; 619,727, or 8.9 per cent, because they were already in the military or naval service of the United States; 540,226, or 7.75 per cent, because they were totally and permanently physically, mentally, or morally unfit to be a soldier; and 918,178, or 13.16 per cent, because of alien allegiance.

The 619,727 men already in the military or naval service of the United States were for the most part members of the various National Guard organizations, or were volunteers in the Regular Army, National Guard, or in officers' training camps, and the naval service. Although there are no figures available, it is probable that this volunteer group is much above the average intelligence of the later draft quotas. The 473,892 men in deferred classes for occupational and industrial reasons are undoubtedly much above the average of men in the same occupation who were not considered to be sufficiently necessary to be given deferred classification. Clearly the selective service act tended to keep out of the Army the most skilled and most intelligent in those agricultural or industrial enterprises that were considered "essential." For this reason one can not hold that the occupational intelligence standards set forth in the above tables are reliable standards of the intelligence of various occupational groups in civil life.

With the facts in mind concerning the tendency of the selective service act to send men to camp who on the average are probably slightly inferior to the average of the general population we can readily explain some of the inconsistencies involved in figure 57. That farmers should be ranked so low in intelligence is surprising. In all probability the bulk of this group represents unmarried, unskilled farm laborers. The married (with dependents) and the necessary skilled farm laborers in essential agricultural enterprises were exempted according to the provisions of the selective service act.

The low standing of tailors is probably due to a loose definition of that trade; many are probably classified as tailors who do routine mechanical machine labor in large tailoring establishments. Also there is probably a large percentage of the group who are of foreign parentage. Such a fact in itself would lower the rating of the group.

Our railroads were classified as essential industries, and exemptions have undoubtedly occurred in the case of locomotive enginemen and firemen. Those enginemen and firemen who failed to obtain exemption are probably those who, because of inferior ability, were unable to secure the necessary affidavits declaring them to be "necessary for the industry." The data for these two groups is therefore probably unreliable. That the engineer group has a rating slightly (although not significantly) inferior to that of the firemen group seems to indicate that the ratings of men in these two groups have been seriously affected by "selection."

It is entirely possible that many of the occupational groups (particularly those skilled and technical trades in the middle of the graph) are misplaced relative to one another, and it is possible too that many of them show too low a median rating. The exemptions granted the "necessary highly specialized technical or mechanical expert of necessary industrial enterprise" have undoubtedly tended to leave as representative of the affected trade those who are below the average attainments of the trade in civil life. In addition to that specific exemption factor we have the fact that those in a given trade who were married and had dependents were exempted. It is reasonable to suppose that those skilled and technical workers in a trade that have married and thus assumed the social and family responsibility involved therein are superior on the average to those who have remained unmarried and were therefore not placed in deferred classification.

Among the professional groups we find similar selective factors at work to lower the ratings of those groups. For example, it is doubtful whether the "accountants" found in draft quotas are representative of accountants found in civil life. It is probable that most "certified public accountants" were exempted because of marriage, involving dependents, or because their technical and expert knowledge was needed by essential industrial enterprises.

It is probable that some of the occupational groups show a reverse tendency, viz, a higher median intelligence rating than is typical for the corresponding group in civil life. It is possible that the group of "stenographers and typists" is such. It has been suggested that many college and university students who had learned to use a typewriter classified themselves occupationally as "typists" upon arrival in depot brigades, and it is certain that a majority of college and university students are above the average intelligence of stenographers and typists in civil life, as the latter rarely go beyond high school. It must also be remembered that male stenographers and typists are not typical representatives of that particular clerical occupation in civil life. The United States Census, 1910, states that female stenographers and typists are five times as frequent as males.

In the preceding paragraphs enough has been said to indicate that the occupational intelligence standards are representative of draft quotas only, and that because of selective factors these Army standards may be quite different from the standards of civil life. Not only must the selective factors be considered but the accuracy of the personnel classification system must be taken into account in determining the significance of the data at hand. The trade classification of the men was based on the personnel interviewing method. Trade tests had not come into general use at the time the study was made. It is possible that the personnel interviewing method was sufficiently inaccurate to affect the reliability of the occupational intelligence standards.

A study of table 377 shows that consistent significant differences in mental ability between apprentices, journeymen, and experts are not present. Of the 32 occupations in group A, we find only 16 which show the experts as superior to the journeymen and journeymen superior to apprentices. And these 16 cases involved only the alpha ratings. With regard to the beta ratings, only 6 occupations show these differences. The differences that are present are only slight; for the alpha ratings the differences between the medians of the three degrees of skill vary from 2 to 13 points, the median difference being 7 points. The beta ratings are not so consistent. These differences vary between 2 points and 34 points, the median difference being 11 points.

It seems reasonable to suppose that a selective process goes on in industry which results in a selection of the mentally more alert for promotion from the apprentice stage to the journeymen

stage and likewise from the journeymen stage to the expert. Those inferior mentally would stick at the lower levels of skill or be weeded out of the particular trade. On this hypothesis one begins to question the accuracy of the personnel interviewing procedure. It is to be noted that the hypothesis does not assume that skill and intelligence are synonymous. It merely involves the assumption that other things being equal, the more intelligent will succeed better in any given trade. The validity of this hypothesis will be brought out later in connection with some data derived from occupational groups that have been trade tested.

It is well to point out in passing that "other things" are not equal. In addition to intelligence we have a special ability fitting one for a special trade and we have "trade customs" that operate to promote from one level of expertness to a higher one on the basis of time spent in the trade. This latter fact militates against a selection of only the most efficient in the higher levels of skill. According to this custom the weak and the strong, the efficient and the inefficient, alike proceed from the apprenticeship stage to the expert stage merely by fulfilling the requirement of time. The classification of soldiers into the A (apprentice), J (journeymen), and E (expert) groups of skill in any trade and occupation by the personnel interviewing method was based partly on the recognition and utilization of this concept that time spent in the trade is the chief differentiating factor. In so far as the personnel system utilized such a criterion it is to be inferred that mistakes were made. The data presented would indicate the desirability of objective measurements of trade ability.

While it is probable that mistakes were made as indicated above it is also probable that many soldiers were classified in occupations in which they actually possessed no ability. The use of trade tests in the camps indicates that approximately 30 per cent of the men claiming trade ability are really novices in that trade. Thus the table of occupational intelligence standards must be looked upon as far from perfect, as being merely indicative and as representative in a general way only of conditions as they exist in depot brigades receiving draft quotas selected under the provisions of the selective service act. Such limitations upon the accuracy of the standards do not invalidate the use of such a table in preventing the misplacement of the poorest 10 or 25 per cent of each occupational group. Such rough and practical use would probably justify itself in a resulting increased percentage of successful placement.

The above criticisms must not be emphasized to the exclusion of certain features of the study that are of the utmost significance. This significance is not limited to its function as an additional aid for Army personnel work but has wider application in the fields of economic theory, employment management, and vocational guidance and training.

Figure 57 brings out the fact that there seem to be four or five occupational levels. The highest level might be termed the professional level, and is probably subdivided into two parts—those professional groups having very high educational and professional standards (median intelligence rating A) and those professional groups having slightly lower educational and professional standards (median intelligence rating B). The next lower level contains such occupational groups as clerical workers, technical workers, and probably those skilled mechanics and skilled operatives who because of high average intelligence and leadership become foremen (the median intelligence of this level is C+). In the next lower level we have apparently a larger number of occupational groups than in any other. The bulk of these occupational groups fall under the heading of skilled mechanics and skilled operatives and the semiskilled worker (median intelligence of this level is C). The lowest level is next and contains those occupational groups that may be characterized as unskilled labor (median intelligence of this level is C−).

To demonstrate whether the differences between these four or five levels are significant, statistical methods were utilized in the case of the midmost occupations in each group. In the lowest occupational level teamsters are midway in intelligence between laborers and barbers. The ratings for teamsters therefore were taken as representative of that occupational level. Similarly, locomotive firemen were taken as representative of the next higher level, telegraphers as representative of the next higher level, accountants of the next higher level, and engineering officers of the highest level.

Mr. Carl R. Brown utilized Pearson's method of comparing distributions in order to determine the probability that the observed differences between them are due to the operation of different types of selection (or significantly different degrees of the same type of selection). He reports as follows:

Using letter-grade frequencies, the quantity x^2 was calculated for pairs of distribution as follows:

Comparison.	
Engineers *v.* accountants	242.97
Accountants *v.* telegraphers	100.7
Telegraphers *v.* locomotive firemen	100.17
Locomotive firemen *v.* teamsters	124.44

These values of x^2 are too large to allow the use of Elderton's tables. By means of the original formula the value of P for the first comparison (Engineers *v.* accountants) was found to be -47, ($P=25.10$). Since the probability that the difference between these two distributions of letter grades is the result of chance is so small, we may conclude (using the converse statement) that the two populations represented by our samples are clearly differentiated as regards Army intelligence ratings.

Although the x^2 values obtained from the other comparisons are only about half that for engineers *v.* accountants, they are outside the limits of Elderton's tables, and indicate such an infinitesimal probability that chance is the sole factor that all of the groups under consideration may be regarded as distinct from the point of view of Army intelligence ratings.

The significance of Group I is brought out not only by its subdivision into four or five occupational levels, but also by the fact that similar occupations are "bunched" on the intelligence scale. That is, similar occupations have similar distributions of intelligence with medians approximately the same. For example: General auto repairmen, auto-engine mechanics, and auto assemblers are all in the upper part of the C group of occupations. Then in the upper part of the C+ group we have railroad clerks, filing clerks, and general clerks "bunched" together with practically the same median scores. It is also interesting to note that telephone operators fall in the uppermost part of the C group, while telegraphers are well in the middle of the C+ group. Bookkeepers bear the same relation to accountants with the exception that each is in a higher letter grade.

In view of the possibility that the table of occupational intelligence standards is unreliable in part because of inaccuracies of the personnel methods, data were requested for soldiers who had been occupationally classified by trade tests. Sufficient returns were obtained on eight occupations to warrant the construction of table 379, which gives a percentage distribution of intelligence ratings of men not trade tested (data previously secured and reported in table 378), and of men who passed the trade test, i. e., qualified as apprentices or better in that trade.

TABLE 379.—*Intelligence and occupation. Percentage distribution of letter grades of men not trade tested and of men who passed the trade tests. Study of Surgeon General's Office.*

Occupation.			Letter grades.							Total cases.	Per cent beta.
			D−.	D.	C−.	C.	C+.	B.	A.		
6g	General machinist	Not trade tested	4.1	10.8	22.4	29.2	21.2	9.3	3.0	1,251	14.9
		Passed trade test	.2	2.7	11.1	24.4	36.8	17.3	7.5	451	11.8
8g	General carpenter	Not trade tested	3.3	10.5	24.1	31.9	20.7	7.6	1.9	792	17.0
		Passed trade test	3.2	1.6	19.4	29.0	24.2	16.1	6.5	62	9.7
24g	General auto repairman	Not trade tested	1.9	6.7	21.2	31.7	25.1	10.6	2.8	1,249	8.6
		Passed trade test	1.3	2.3	12.3	34.1	27.6	15.5	6.6	666	1.2
14p	Plumber	Not trade tested	2.6	9.6	20.4	31.8	23.7	9.3	2.6	270	17.0
		Passed trade test	1.3	6.5	20.8	29.8	22.1	19.5	.....	77	9.1
7r	General blacksmith	Not trade tested	5.4	14.0	20.5	31.3	18.8	8.3	1.7	351	21.6
		Passed trade test	7.0	9.3	16.3	27.9	20.9	16.3	2.3	43	16.3
23t	Heavy truck driver	Not trade tested	3.1	11.0	24.2	32.6	18.2	8.3	2.6	1,049	13.0
		Passed trade test	1.9	7.1	17.5	32.5	23.5	11.3	6.2	644	14.3
27h	Horseshoeer	Not trade tested	8.8	19.4	24.3	27.0	13.9	4.5	2.1	1,021	29.2
		Passed trade test	3.7	10.1	22.0	28.1	21.6	9.1	5.4	296	7.1
40c	Cook	Not trade tested	6.2	16.8	22.1	29.0	17.9	7.3	.7	435	28.5
		Passed trade test	3.1	10.9	21.9	26.6	25.0	9.4	3.1	64	17.2

It will be noted that in every case except that of truck drivers the per cent of beta men qualifying on the basis of trade tests is much lower than on the basis of personnel interview.

Inspection of the table also indicates that in every case the distribution of cases for those passing the trade tests is skewed toward the A and B end of the scale. For those not trade tested we have a relatively larger number of cases located toward the D and D− end of the scale.

The significance of the differences of these intelligence distributions was determined by Mr. Brown with Pearson's method used above. The results are as follows:

Occupation.		P (Elderton's tables).	
6g	General machinist	0.000000	Significantly different.[1]
8g	General carpenter	.009283	Do.
24g	General auto repairman	.000000	Do.
14p	Plumber	.198000	Not significantly different.
7g	General blacksmith	.676676	Do.
23t	Heavy truck driver	.000003	Significantly different.
27h	Horse hostler	.000001	Do.
40c	Cook	.320847	Not significantly different.

[1] NOTE.—0.020000 or less is considered significant—viz, odds are 50 to 1 against chance as the sole factor in causing the difference.

By reference to table 379, we see that only a small number of cases of plumbers, general blacksmiths, and cooks have been trade tested. It is largely for this reason that the differences turn out to be insignificant. This lack of significance means that it is necessary to obtain more cases in order to show any real difference that may exist. The results in the other five occupations indicate that there are real differences in the direction of superiority in intelligence of those qualifying in a trade on the basis of trade tests as compared with those qualifying on the basis of personnel interview. The facts seem to indicate that intelligence is a factor in the successful passing of the trade tests and that this is true even in such a trade as 23t (heavy truck driver) where a performance trade test is in use.

An analysis of the relation between degrees of skill in an occupation (as measured by trade tests) and intelligence ratings is possible on the basis of table 380, which gives a percentage distribution of intelligence ratings of apprentices, journeymen, and experts as classified by trade tests. Only four occupations had a sufficient number of cases in each group to warrant presentation.

TABLE 380. *Intelligence and occupation. Percentage distribution of letter grades of apprentices (A), journeymen (J), and experts (E) separately, as classified by trade tests.*

Occupation.			Letter grades.							Number of cases.
			D−.	D.	C−.	C.	C+.	B.	A.	
24g	Auto repairman	A	3.1	2.7	18.1	34.8	27.0	10.2	4.1	293
		J	.....	2.0	9.1	36.4	26.9	17.5	8.1	297
		E	.....	1.3	2.6	25.0	33.0	27.6	10.5	76
6g	Machinist	A	.....	5.3	14.3	27.7	39.3	10.7	2.7	112
		J	.4	2.3	11.3	26.4	33.5	19.1	7.0	257
		E	.....	.....	6.1	13.4	43.9	20.7	15.9	82
23t	Truck driver	A	3.4	5.9	17.6	36.1	24.4	7.6	5.0	119
		J	1.5	8.0	18.4	30.9	23.1	11.4	6.7	463
		E	1.6	3.2	11.3	37.1	24.2	17.8	4.8	62
27h	Horse hostler	A	5.1	13.2	25.7	28.0	16.0	5.7	6.3	175
		J	1.9	6.5	17.6	25.9	29.6	13.9	4.6	108
		E	.....	.....	7.7	46.1	30.8	15.4	.....	13

The significance of the differences of these distributions was also worked out in the same manner as above, and the results were as follows:

Occupation.		Comparison.	P (Elderton's tables).	
24g	General auto repairman	A and J	0.000145	Significant.
		J and E	.124652	Not significant.
		A and E	.000039	Significant.
6g	Machinist	A and J	.124652	Not significant.
		J and E	.013754	Significant.
		A and E	.000341	Do.
23t	Heavy truck driver	A and J	.543813	Not significant.
		J and E	.423190	Do.
		A and E	.423190	Do.
27h	Horse hostler	A and J	.009283	Significant.
		J and E	.....	Not determined because the number of experts (13) does not warrant treatment.
		A and E	.....	

In the case of both 24g and 6g we have significant differences in two of the three comparisons. In the case of 27h we have a significant difference between apprentices and journeymen. In the case of 23t we find that none of the differences between any of the pairs of degrees of skill are significant. It would seem that the function of intelligence plays a varying part in its relation to degrees of skill as classified by trade tests. For example, in the case of 24g we seem to find a difference only between the apprenticeship level and the higher levels of skill. In the case of 6g we find the difference only between the expert level and the two lower levels. In the case of 23t we find no significant differences between levels of skill, although intelligence is demonstrably a factor in qualifying in the apprenticeship level of that trade.

To secure a single measure representative of the degree of relationship between intelligence ratings and degree of expertness as measured by trade tests Pearson's coefficient of mean square contingency was utilized. Results were as follows:

	Occupation.	C.	Number of cases.
24g	Auto repairman	0.265	666
6g	Machinist	.234	451
23t	Heavy truck driver	.130	644
27h	Horseshoeler	.276	296

The above coefficients indicate that there is a slight degree of relationship existing between intelligence and degree of expertness measured by trade tests, particularly oral trade tests. The trade tests for heavy truck drivers is a performance test, and one would hardly expect intelligence as measured by Army intelligence tests to show any relationship to a nonlanguage performance test. It is not surprising, therefore, to find the coefficient to be only 0.13. However, to qualify in the trade does involve the intelligence factor. This is shown by the fact that those passing the trade test for truck drivers are significantly more intelligent than those who claimed trade ability and were so classified by personnel interview.

Not enough data are available to determine in any satisfactory way the interrelations of intelligence, skill, and expertness in various trades. That the relative importance of these factors should vary from trade to trade is probably to be expected and is probably dependent upon a wide variety of causes involving the nature of the specific trade and the types of people who gravitate into that trade.

Enough evidence is present concerning the influence of intelligence upon the results of trade tests to warrant the use of intelligence tests in conjunction with trade tests. Such use would be based on the principle that, assuming equal ability of two or more persons as measured by a trade test, the more intelligent should be selected for placement.

A further comparison between the results of the studies made in Camp Wadsworth, Camp Devens, and the Surgeon General's Office brings out in detail the fact that the relative ranking of various occupations by the alpha examination is very similar in the studies mentioned. Tables 381, 382, and 383 give the several comparisons. To summarize the results of these comparisons we have the following correlation values:

Wadsworth study *v.* Devens study	+0.90
Devens study *v.* Surgeon General's study	+ .88
Wadsworth study *v.* Surgeon General's study	+ .98

TABLE 381.—*Intelligence and occupation. Foot-rule coefficients of correlation of occupational groups common to the studies from Camp Wadsworth and Camp Devens.*

Occupations are ranked according to median alpha scores.

Occupation.	Wadsworth study.		Devens study.		Gains.
	Median weighted alpha.	Rank.	Median weighted alpha.	Rank.	
Civil engineer	274	1	250	3.5	.....
Lawyer and teacher	252	2	262	1	1
Student	239	3	246	5	.....
Dentist and mechanic dentist	229	4	195	7	.....
Draftsman	206	5	231	6	.....
Chemist	205	6	253	2	4
Mechanical engineer	195	7	250	3.5	3.5
Druggist	192	8	174	9	.....
Clerk	175	9	186	8	1
Salesman	170	10	172	10	.....
Gas engine mechanic	129	11	147	14	.....
Auto mechanic	122	12.5	146	15	.....
Electrician	122	12.5	162	12.5	.....
Musician	119	14.5	169	11	3.5
Policeman	119	14.5	139	16	.....
Butcher	118	16	111	23	.....
Plumber	117	17	129	18	.....
Blacksmith	109	18	87	28	.....
Machinist	107	19	136	17	2
Baker and cook	106	20	93	26	.....
Chauffeur	104	21	120	20	1
Painter	103	22	115	21.5	.5
Printer	99	23	162	12.5	10.5
Lumberman	96	24	115	21.5	2.5
Carpenter	91	25	127	19	6
Farmer	73	26	97	24	2
Teamster	72	27	95	25	2
Barber	65	28	87	28	.....
Laborer	63	29	87	28	1

$R = +0.71$ $r = +0.90$ Sum of gains = 40.5

TABLE 382.—*Intelligence and occupation. Foot-rule coefficients of correlation of occupational groups common to the studies from Camp Devens and of the Surgeon General's Office.*

Occupations are ranked according to median alpha scores.

Occupation.	Devens' study.		Surgeon General's study.		Gains.
	Median weighted alpha.	Rank.	Median weighted alpha.	Rank.	
Auto repairer	146	9.5	65	11.5	.....
Baker	146	9.5	59	21	.....
Barber	87	25.0	55	23	2
Blacksmith	87	25.0	61	17	8
Bookkeeper	244	2	101	4	.....
Brakeman	120	15.5	63	14.5	1
Butcher	111	19	61	17	2
Carpenter	127	14	60	19	.....
Chauffeur	120	15.5	65	11.5	4
Clerk	186	5	96	5	.....
Cook	93	23	59	21	2
Draftsman	231	3	114	3	.....
Electrician	162	7	81	6	1
Farmer	97	21	48	26	.....
Fireman, railroad	103	20	61	17	3
Laborer	87	25	47	27	.....
Lineman	115	17.5	64	13	4.5
Machinist	136	12	63	14.5	.....
Mechanic	147	8	68.5	9	.....
Painter	115	17.5	59	21	.....
Plumber	129	13	66	10	3
Policeman and detective	139	11	69	8	3
Stenographer	253	1	115	2	.....
Stock keeper	174	6	78	7	.....
Tailor	85	27	53	24	3
Teamster	95	22	50	25	.....

$R = +0.68$ $r = +0.88$ Sum of gains = 36.5

TABLE 383.—*Intelligence and occupation. Foot-rule coefficients of correlation of occupational groups common to the studies from Camp Wadsworth and of the Surgeon General's Office.*

Occupations are ranked according to median alpha scores.

Occupation.	Wadsworth study.		Surgeon General's study.		Gains.
	Median weighted alpha.	Rank.	Median raw alpha.	Rank.	
Draftsman	206	1	114	1	.....
Mechanical engineer	195	2	110	2	.....
Clerk	175	3	96	3	.....
Telegrapher	165	4	85	5	.....
Photographer	159	5	86	4	1
Farrier	155	6	73	7	.....
Telephone operator	127	7	70	8	.....
Auto engine mechanic	122	8.5	66	11.5	.....
Electrician	122	8.5	81	6	2.5
Policeman	119	10	69	9	1
Butcher	118	11	61	15.5	.....
Plumber	117	12	66	11.5	.5
Pipe fitter	116	13	66	11.5	1.5
Blacksmith	109	14.5	61	15.5	.....
Gunsmith	109	14.5	66	11.5	3
Machinist	107	16	63	14	2
Baker and cook	106	17	59	18.5	.....
Chauffeur (heavy truck)	104	18	58	20	.....
Painter	103	19	59	18.5	.5
Carpenter	91	20	60	17	3
Farmer	73	21	48	23	.....
Teamster	72	22	50	22	.....
Barber	65	23	55	21	2
Laborer	63	24	47	24	.....

$R = +0.82$ $r = +0.96$ Sum of gains=17.0

The striking similarity in ranking of the occupations common to these studies speaks for the general reliability of the results for those occupations. Specifically it indicates that any selective factors that may have been operative in determining the nature of Army occupational groups were generally operative. That is to say, in the various camps the same general conditions prevail. From the practical point of view of the Army our belief is strengthened that the table of occupational intelligence standards can be used in the Army with resulting increased efficiency in the placement of men.

It is in point to mention briefly in this chapter two studies made in Washington by the Section of Psychology during the winter of 1918–19.

One hundred and six employees of the Civil Service Commission, who had been selected with unusual care and retained for several months and in many cases for several years, were given group examination alpha. Since unsatisfactory employees would not have been retained it is to be presumed that the group is a competent group. The civil-service ratings, assigned in percentages on the basis of examination at the time of entry into the civil service range from 70 to 94. The median alpha score for this group is 150 with extremes of 199 and 70. For the entire group the correlation of alpha score with civil-service rating is +0.48. For a group of 73 who are classified as clerks, the correlation is +0.53.

In a group of 106 graphotype operators of the Treasury Department, the median alpha score is 75 with extremes of 11 and 174. The median of the average daily output of plates by this group is 245 with a median error of 2.9 per cent. The highest individual average is 391 plates per day; the lowest, 113. The correlation between output and accuracy is +0.113; between alpha and accuracy, +0.019; and between alpha and output, −0.087. The returns are of special interest in that they exhibit such low correlations between intelligence and accuracy and speed in mechanical work.

CHAPTER 16.

RELATION OF RATINGS TO ARM OF THE SERVICE.

In the chapter on the results of examination *a* (Part II, pages 494ff), comparisons of the intelligence of the enlisted personnel in various organizations and various branches of the service have already been made. Owing to the fact that at the earlier time referred to no intelligence test had been developed for the foreign born and illiterate soldier, and owing further to differences among the four camps in regard to the basis of segregation, the comparative results there found were not regarded as altogether reliable. Comparisons of the ratings received in examination *a* by officers in different branches of the service have also been made.

This chapter is an attempt to furnish more reliable information. The matter is thought to be of significance, since at some camps organizations with similar functions were balanced with regard to psychological grades, and in others allowances were made in assignments on the basis of psychological grades after occupational needs had been met. It was thought that such assignments could best be based upon results actually found true in the case of well-established organizations.

After the work with examination *a* in the first four camps for the most part newly drafted men, and not established organizations, were examined. In only a few cases were divisional organizations examined. The lack of uniformity with regard to the basis of segregation of illiterates persisted, however. It was nevertheless considered worth while to make a second computation at the later time, since the addition of the beta examination had made possible the determination of letter grades for entire organizations.

The basis of the present discussion is the principal sample of enlisted men, Group VIII, and the principal sample of officers Group VI. For details as to the method of selection of these groups, see chapter 1, Part III. It is worth noting, however, that the record cards for Group VIII were drawn, in so far as possible, from a small number of camps with as many different branches of the service as possible represented in each camp. Thus it was hoped that differences of segregation might neither obliterate nor unjustifiably increase real differences between organizations. It is worth noting that 56 per cent of Group VIII was drawn from four camps (Cody, Lee, Sheridan, Kearny); and that 80 per cent of the group was drawn from these four and four other camps (Travis, Sevier, Bowie, and Lewis). Camps known to have received especially good or especially poor men were chosen in as nearly as possible equal numbers in order that the combined figures should represent as nearly as might be the typical situation.

The fact that the new figures to a striking degree confirm the earlier findings still further convinces us that the comparisons now to be made are reliable for practical purposes.

Tables 384 to 390 show the detailed results for enlisted men. Table 391 is derived by considering and combining the alpha grades of men who took alpha only, the beta grades of men who took beta only, and alpha-beta only, and the grades received in each of the three individual examinations. For the sake of comparison certain other percentages are given in this table. Thus the negro draft (Group IV,) a negro infantry regiment, and the white officers (Group VI) are also represented. In the case of the infantry the general percentages are computed by combining infantry supply, infantry rifle, infantry machine gun, and infantry headquarters company percentages pro-rated by companies, i. e., giving weights of 1, 12, 1, and 1, respectively. In the case of artillery the

general percentages are similarly obtained by giving pro rata weights of 1, 8, 1, 1, respectively, to the percentages obtained by artillery supply company, artillery battery, trench mortar battery, and artillery headquarters company. In the case of the sanitary train the general percentage is obtained by giving the weight of 8 to the percentage of the ambulance company and 5 to the percentage of the field hospital company, since the ratio of strength in these organizations is approximately 8 to 5.

A bird's-eye view of the results of this study may be obtained by reference to figure 58.

TABLE 384.—*Variables: Alpha score × military organization. Group VIII: Established white organizations.*

For men who took alpha only.

Alpha score.	Infantry headquarters company.	Infantry rifle company.	Infantry supply company.	Infantry machine-gun company.	Artillery headquarters company.	Artillery battery.	Artillery supply company.	Artillery trench mortar battery.	Machine-gun battalions.	Engineers.	Field signal battalion.	Medical.	Military police.	Ammunition train.	Supply train.	Sanitary train ambulance company.	Sanitary train field hospital.	Development battalion.	Officers' training camp.	Nurses.	Camp base hospital.	Overseas base hospital.	Quartermaster.	Engineers' train.	Total.
Code No.	31	41	51	61	32	42	52	62	03	05	06	09	15	16	17	19	20	22	23	26	39	40	08	18	.....
205–212	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1
200–204	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....	....	....	2
195–199	....	....	....	2	1	....	....	1	1	....	1	1	....	....	....	1	....	2	5	....	....	2	....	....	17
190–194	1	....	....	2	....	3	....	1	....	....	....	....	....	....	....	....	....	....	4	....	....	2	....	....	13
185–189	4	1	1	2	1	4	....	1	1	....	2	4	....	....	2	1	3	1	8	1	1	4	....	....	42
180–184	5	3	1	1	1	4	1	1	....	3	....	3	3	....	....	2	2	2	12	1	4	5	1	....	55
175–179	6	3	2	1	5	11	2	1	6	6	4	2	4	2	6	3	3	1	22	4	3	7	....	....	104
170–174	3	4	....	3	3	10	1	....	4	2	9	3	3	1	1	4	5	4	44	1	10	10	1	....	126
165–169	5	3	1	13	3	14	5	....	2	7	7	8	3	3	1	6	4	3	46	10	11	9	....	....	164
160–164	17	11	5	8	10	13	3	2	6	7	7	9	4	3	2	10	9	5	53	5	17	10	....	3	219
155–159	6	12	3	9	16	18	5	....	9	4	19	13	5	2	2	5	12	4	53	8	19	12	....	5	241
150–154	10	10	2	9	18	25	5	2	9	10	21	10	15	4	4	15	18	6	92	9	24	15	....	....	333
145–149	14	5	5	11	16	16	6	4	11	12	19	16	7	9	8	16	15	6	109	9	29	20	....	....	363
140–144	8	15	10	8	24	19	8	2	19	12	25	14	8	7	4	18	26	7	129	4	31	21	....	9	428
135–139	23	27	5	18	18	18	16	5	14	7	32	11	10	5	7	14	21	10	149	15	28	21	2	6	482
130–134	28	23	11	23	27	28	6	13	9	10	39	23	9	8	11	16	19	15	125	17	33	31	3	11	538
125–129	20	23	8	23	25	42	17	13	18	12	40	19	10	8	9	18	31	8	120	18	30	30	6	5	553
120–124	28	36	11	26	37	29	7	14	20	8	30	31	17	12	6	25	21	7	107	20	35	25	3	4	559
115–119	28	35	20	28	37	32	14	9	12	17	41	30	13	21	22	31	31	24	141	16	43	35	3	15	638
110–114	32	39	14	35	37	34	23	15	26	19	58	21	13	18	19	26	32	16	102	26	41	30	7	7	690
105–109	28	60	21	29	40	47	26	11	22	24	47	31	20	24	19	36	27	24	87	23	43	31	8	4	732
100–104	27	46	18	47	37	51	24	11	35	26	37	30	18	25	26	31	35	21	119	25	44	36	3	3	775
95– 99	38	65	28	29	40	50	32	18	29	24	41	29	14	26	28	25	38	17	96	27	49	44	6	....	793
90– 94	42	68	36	37	33	63	31	12	36	20	49	39	15	20	31	40	31	40	81	26	39	36	11	4	840
85– 89	32	69	35	54	28	79	28	10	36	32	37	49	27	27	23	33	32	35	69	21	48	42	8	12	866
80– 84	36	78	39	47	40	87	33	14	41	34	38	29	21	19	29	39	19	33	53	24	47	46	10	9	865
75– 79	44	70	27	48	40	82	40	14	46	25	36	35	21	20	30	41	27	38	44	17	38	33	8	7	831
70– 74	31	93	33	40	52	92	40	22	32	26	37	27	18	22	32	38	30	41	35	19	53	34	11	10	868
65– 69	37	96	53	54	37	84	44	14	43	25	39	27	25	26	39	29	31	51	29	16	44	32	10	19	902
60– 64	43	76	47	48	31	79	40	19	33	28	35	41	23	29	42	37	34	48	19	14	41	32	5	12	856
55– 59	29	98	42	46	40	93	42	25	34	32	32	34	25	28	30	35	27	65	16	13	40	43	16	8	893
50– 54	34	78	42	43	42	102	49	27	39	38	36	36	21	41	30	33	35	54	12	6	37	32	11	6	884
45– 49	36	83	53	47	35	90	39	18	37	26	26	27	30	33	23	33	24	56	2	9	28	34	9	14	812
40– 44	47	76	54	54	18	58	42	19	45	25	32	21	31	23	27	31	22	45	12	8	34	21	17	10	772
35– 39	21	84	43	45	30	81	42	13	33	14	28	25	27	24	25	45	24	56	9	3	25	25	....	....	722
30– 34	21	62	43	27	22	83	43	13	27	25	14	20	27	28	20	30	14	50	1	....	21	22	....	....	631
25– 29	31	74	57	32	25	79	28	9	43	17	12	30	22	14	22	35	17	41	3	2	22	16	....	....	631
20– 24	14	59	44	27	15	55	33	17	17	21	11	27	17	15	14	24	7	40	1	1	14	16	....	....	489
15– 19	16	46	22	24	13	47	22	3	28	20	9	19	9	15	15	24	15	28	....	1	21	13	....	....	410
10– 14	7	12	17	5	8	19	11	5	9	11	1	12	3	13	4	8	2	19	2	....	10	7	....	....	185
5– 9	10	20	10	1	1	17	6	4	14	16	5	2	5	5	2	1	1	18	1	1	5	3	....	....	148
0– 4	4	5	9	....	....	6	4	1	3	13	1	....	2	5	2	4	....	7	....	....	6	2	....	....	74
Total	866	1,668	872	1,006	904	1,764	818	388	849	659	957	818	545	585	617	863	744	948	2,014	420	1,071	889	159	183	20,607

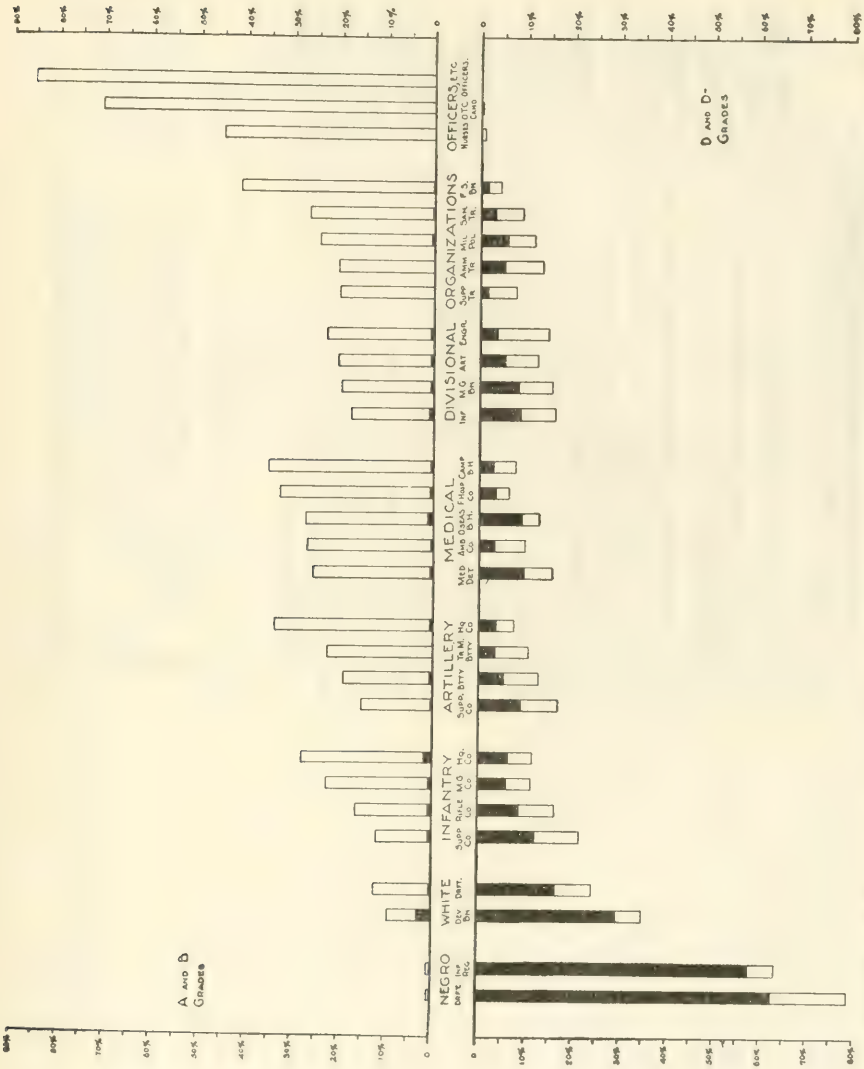


FIG. 5. Percentages of A and B and of D and D—letter-grades received by enlisted men in established military organizations of different branches of the service, compared with similar percentages for draft quotas, development battalions, and groups of officers, officer-candidates, and nurses. Alpha, beta, and individual examination grades combined. Per cent of beta and individual examination in black. See text for explanation in cases of infantry, artillery, and sanitary train.

TABLE 385.—*Variables: Alpha score × military organization. Group VIII: Established white organizations.*

For men who took alpha only, or alpha-beta only, or, with alpha, an individual examination.

Alpha score.	Infantry headquarters company.	Infantry rifle company.	Infantry supply company.	Infantry machine-gun company.	Artillery headquarters company.	Artillery battery.	Artillery supply company.	Artillery trench mortar battery.	Machine-gun battalions.	Engineers.	Field signal battalion.	Medical.	Military police.	Ammunition train.	Supply train.	Sanitary train ambulance company.	Sanitary train field hospital.	Development battalion.	Officers' training camp.	Nurses.	Camp base hospital.	Overseas base hospital.	Quartermaster.	Engineers' train.	Total.
Code No.	31	41	51	61	32	42	52	62	03	05	06	09	15	16	17	19	20	22	23	26	39	40	08	18	.....
205–212	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	1
200–204	....	....	....	....	....	....	....	....	....	....	....	1	....	....	....	....	....	....	1	....	....	....	....	....	2
195–199	....	....	....	2	1	....	....	1	1	....	1	1	....	....	....	1	....	2	5	....	....	2	....	....	17
190–194	1	....	....	2	....	3	....	1	....	....	....	....	....	....	....	....	....	....	4	....	....	2	....	....	13
185–189	4	1	1	2	1	4	....	1	1	....	2	4	....	....	2	1	3	1	8	1	1	4	....	....	42
180–184	5	2	1	1	1	4	1	1	....	3	....	3	3	....	....	2	2	2	12	1	1	5	1	....	51
175–179	6	3	2	1	5	11	2	1	6	6	4	2	4	2	6	3	3	1	22	4	3	8	....	1	106
170–174	3	4	....	3	3	10	1	....	4	2	9	3	3	1	1	4	5	4	44	1	10	10	1	....	126
165–169	5	3	1	13	3	14	5	....	2	7	7	8	3	3	1	6	4	3	46	10	11	9	....	....	164
160–164	17	11	5	8	10	13	3	2	6	7	7	9	4	3	2	10	9	5	53	5	17	10	....	3	219
155–159	6	12	3	9	16	18	5	....	9	4	19	13	5	2	2	5	12	4	53	8	19	12	....	5	241
150–154	10	10	2	9	18	25	5	2	9	10	21	10	15	4	4	15	18	6	92	9	24	15	....	....	333
145–149	14	5	5	11	16	16	6	4	11	12	19	16	7	9	8	16	15	6	109	9	29	20	....	....	363
140–144	8	15	10	8	24	19	8	2	19	12	25	14	8	7	4	18	26	7	129	4	31	22	....	9	429
135–139	23	27	5	18	18	18	16	5	14	7	32	11	10	5	7	14	21	10	149	15	28	21	2	6	482
130–134	28	23	11	23	27	28	6	13	9	10	39	23	9	8	11	16	19	15	125	17	34	33	3	11	541
125–129	20	23	8	23	25	42	17	13	18	12	40	19	10	8	9	18	31	8	120	18	30	30	6	5	553
120–124	28	36	11	26	37	29	7	14	20	8	30	31	17	12	6	25	21	7	107	20	35	25	3	4	559
115–119	28	35	20	28	37	32	14	9	12	17	41	30	14	21	22	31	31	24	141	16	43	35	3	15	699
110–114	32	39	14	35	38	35	23	15	26	19	58	21	13	18	19	26	32	16	102	26	41	30	7	7	692
105–109	28	61	21	29	40	47	26	11	22	24	47	31	20	24	19	36	27	25	87	23	43	31	8	4	734
100–104	28	46	18	47	37	51	24	11	35	26	37	30	18	25	26	31	36	21	119	25	44	36	8	3	777
95– 99	38	65	28	29	40	50	32	18	29	24	41	29	14	26	28	25	38	17	96	27	49	44	6	....	793
90– 94	42	68	36	37	33	63	31	12	36	20	49	39	15	20	31	40	31	40	81	26	39	38	11	4	842
85– 89	32	69	35	54	28	79	28	10	36	32	37	49	27	27	23	33	32	35	69	21	48	43	8	12	861
80– 84	36	78	39	47	40	87	33	14	41	34	38	29	21	19	29	39	19	33	53	24	47	47	10	9	866
75– 79	44	70	27	48	40	82	40	14	46	35	36	35	21	20	30	41	27	38	44	17	38	33	8	7	841
70– 74	32	93	34	40	52	92	40	22	32	26	37	27	18	22	32	38	33	41	35	19	54	35	11	10	875
65– 69	37	96	54	54	35	84	44	14	43	25	39	27	25	26	39	30	31	51	29	16	44	32	10	19	904
60– 64	43	76	47	48	31	79	40	20	33	28	35	41	23	29	42	37	34	48	19	14	41	32	5	12	857
55– 59	29	98	42	47	40	93	42	25	34	32	32	35	25	28	30	36	27	65	16	13	40	44	16	8	897
50– 54	34	79	43	43	42	102	49	27	39	38	36	36	21	41	30	34	35	54	12	6	37	33	11	5	888
45– 49	36	86	54	47	35	92	39	18	37	26	26	32	30	33	23	33	24	56	2	9	28	36	9	14	825
40– 44	47	77	54	54	18	58	42	19	45	26	32	26	31	23	27	31	23	45	12	8	34	24	17	10	783
35– 39	21	84	43	45	30	82	42	13	34	14	28	39	33	24	25	45	24	56	9	3	25	27	....	....	746
30– 34	22	65	43	27	22	85	43	18	27	29	16	37	27	28	20	30	14	50	1	....	24	22	....	....	654
25– 29	31	75	57	32	25	84	28	9	45	20	19	30	22	14	22	35	17	43	3	....	22	21	....	....	656
20– 24	14	61	45	28	15	57	33	17	21	26	12	36	22	15	14	25	7	45	1	1	14	17	....	....	526
15– 19	17	52	25	29	13	50	22	4	29	20	9	26	10	18	15	26	17	35	.....	1	21	14	....	....	453
10– 14	13	29	39	23	12	33	15	7	14	19	3	25	10	13	8	10	5	26	2	....	11	12	....	....	329
5– 9	13	39	27	5	4	22	11	5	19	24	7	9	11	5	5	8	3	36	1	1	5	5	....	....	269
0– 4	10	12	16	3	4	7	8	1	6	15	2	5	7	5	3	4	....	12	.....	....	6	3	....	....	129
Total	885	1,728	926	1,042	916	1,800	831	393	864	699	972	892	576	588	625	878	756	993	2,014	418	1,071	922	159	184	21,132

Table 386—*Variables: Beta score × military organization. Group VIII: Established white organizations.*

For men who took beta only or alpha-beta only.

Beta score.	Infantry headquarters company.	Infantry rifle company.	Infantry supply company.	Infantry machine-gun company.	Artillery headquarters company.	Artillery battery.	Artillery supply company.	Artillery trench mortar battery.	Machine-gun battalion.	Engineers.	Field signal battalion.	Medical.	Military police.	Ammunition train.	Supply train.	Sanitary train ambulance company.	Sanitary train field hospital.	Development battalion.	Camp base hospital.	Overseas base hospital.	Total.
Code No.	31	41	51	61	32	42	52	62	03	05	06	09	15	16	17	19	20	22	39	40	.....
110–114	3	....	....	1	1	....	....	....	....	....	1	....	....	....	....	....	1	....	....	1	8
105–109	2	3	....	....	....	2	....	....	....	....	....	1	....	....	....	....	....	2	....	1	10
100–104	....	2	2	....	....	1	1	....	2	2	1	....	2	....	....	....	1	5	....	1	20
95– 99	1	3	3	3	1	3	....	....	1	2	1	1	....	....	....	....	2	15	1	3	40
90– 94	7	6	1	4	2	3	1	....	1	2	1	4	1	....	....	3	3	5	2	6	52
85– 89	2	3	2	2	2	7	....	1	4	1	....	1	1	....	....	3	2	21	4	7	63
80– 84	7	6	6	9	2	4	4	....	3	7	....	5	1	....	....	6	1	28	6	6	101
75– 79	3	13	2	9	3	10	4	3	3	7	....	9	4	4	....	3	5	43	2	13	140
70– 74	4	14	9	6	5	8	7	3	2	6	1	7	5	2	1	4	6	33	4	10	137
65– 69	7	11	6	12	6	11	5	1	11	5	2	12	2	4	....	6	9	57	14	22	203
60– 64	3	11	4	7	3	15	13	2	13	6	3	15	5	1	....	5	5	67	10	21	209
55– 59	8	17	8	8	3	20	15	2	14	6	4	17	3	4	....	4	2	70	1	17	223
50– 54	17	25	18	8	2	10	15	1	9	4	2	13	4	4	....	7	6	64	9	19	237
45– 49	11	19	16	8	....	18	17	3	5	5	1	20	7	5	....	5	51	5	4	13	213
40– 44	7	21	11	12	5	27	10	3	10	4	1	22	10	3	....	2	7	81	5	18	259
35– 39	8	22	10	9	9	18	12	....	10	3	....	15	5	3	1	9	5	73	5	19	236
30– 34	9	24	26	9	6	15	11	1	12	5	2	12	4	5	1	6	2	64	10	18	242
25– 29	2	27	21	10	4	11	11	1	11	4	2	7	6	3	....	2	5	60	5	16	208
20– 24	6	24	17	15	2	14	14	....	8	3	2	14	8	9	....	4	4	79	1	9	233
15– 19	3	5	7	5	1	5	10	....	4	....	....	3	1	5	1	1	1	37	2	9	100
10– 14	3	1	3	2	3	5	7	....	3	....	1	1	....	3	....	....	1	43	3	4	85
5– 9	3	2	3	1	1	6	3	1	2	....	....	....	....	1	....	....	....	25	1	2	51
0– 4	....	....	2	....	....	....	1	....	2	....	2	....	....	....	....	....	1	17	....	....	25
Total	116	259	179	140	61	213	161	22	130	72	27	178	69	56	4	70	120	894	89	235	3,095

Table 387.—*Variables: Beta score × military organization. Group VIII: Established white organizations.*

For men who took beta only, or alpha-beta only, or, with beta, an individual examination.

Beta score.	Infantry headquarters company.	Infantry rifle company.	Infantry supply company.	Infantry machine-gun company.	Artillery headquarters company.	Artillery battery.	Artillery supply company.	Artillery trench mortar battery.	Machine-gun battalion.	Engineers.	Field signal battalion.	Medical.	Military police.	Ammunition train.	Supply train.	Sanitary train ambulance company.	Sanitary train field hospital.	Development battalion.	Camp base hospital.	Overseas base hospital.	Total.
Code No.	31	41	51	61	32	42	52	62	03	05	06	09	15	16	17	19	20	22	39	40	.....
110–114	3	....	....	1	1	....	....	....	....	....	1	....	....	....	....	....	1	....	....	1	8
105–109	2	3	....	....	....	2	....	....	....	....	....	1	....	....	....	....	....	2	....	1	11
100–104	....	2	2	....	....	1	1	....	2	2	1	....	2	....	....	....	1	5	....	1	20
95– 99	1	3	3	3	1	3	....	....	1	2	1	1	....	....	....	....	2	15	1	3	40
90– 94	7	6	1	4	2	3	1	....	1	2	1	4	1	....	....	3	3	5	2	6	52
85– 89	2	3	2	2	2	7	....	1	4	1	....	1	1	....	....	3	2	21	4	7	63
80– 84	7	6	6	9	2	4	4	....	3	7	....	5	1	....	....	6	1	28	6	6	101
75– 79	3	13	2	9	3	10	4	3	3	7	....	9	4	4	....	3	5	43	2	13	140
70– 74	4	14	9	6	5	8	7	3	2	6	1	8	5	2	1	4	6	33	4	10	138
65– 69	7	11	6	12	6	11	5	1	11	5	2	13	2	4	....	6	9	57	14	22	204
60– 64	3	11	4	7	3	15	13	2	13	6	3	15	5	1	....	5	5	67	10	21	209
55– 59	8	17	8	8	3	20	15	2	14	6	4	18	3	4	....	4	2	70	1	17	224
50– 54	17	25	18	8	2	10	15	1	9	4	2	13	4	4	....	7	6	64	9	19	237
45– 49	11	19	16	8	....	18	17	3	5	6	1	20	7	5	....	5	51	5	4	13	214
40– 44	7	21	11	12	6	28	11	3	10	4	1	23	10	3	....	2	7	81	5	18	263
35– 39	8	22	10	9	9	18	12	....	10	3	....	15	5	3	1	9	5	73	5	19	236
30– 34	9	25	26	9	6	15	11	1	13	5	2	12	4	5	1	6	2	65	10	18	245
25– 29	2	27	22	10	4	12	12	1	11	4	2	8	6	3	....	3	5	64	5	16	217
20– 24	7	27	18	15	2	14	14	....	10	3	2	15	8	9	....	4	4	86	1	9	248
15– 19	9	19	16	12	1	6	10	....	6	4	1	6	2	5	1	1	6	56	2	9	172
10– 14	6	22	17	6	3	5	7	....	12	1	1	8	....	5	1	5	1	71	3	7	179
5– 9	4	17	10	7	1	6	3	1	3	1	....	2	....	1	1	....	....	49	1	2	109
0– 4	2	7	6	1	....	....	1	....	4	1	2	4	....	....	....	....	1	27	....	....	55
Total	129	320	213	158	62	216	163	22	147	80	28	201	70	56	6	76	125	987	89	238	3,386

TABLE 388.—*Variables: Stanford-Binet scale score × military organization. Group VIII: Established white organizations.*

For men who took Stanford-Binet examination.

Stanford-Binet mental age.	Infantry headquarters company.	Infantry rifle company.	Infantry supply company.	Infantry machine-gun company.	Artillery headquarters company.	Artillery battery.	Artillery supply company.	Artillery trench mortar battery.	Machine-gun battalion.	Engineers.	Field Signal Corps.	Medical.	Military police.	Ammunition train.	Supply train.	Sanitary train ambulance company.	Sanitary train field hospital.	Development battalion.	Officers' training camp.	Nurses.	Camp base hospital.	Overseas base hospital.	Quartermasters.	Total.
Code No.	31	41	51	61	32	42	52	62	03	05	06	09	15	16	17	19	20	22	23	26	39	40	05	
17.5–17.9						1												1						2
17.0–17.4																		1						
16.5–16.9																								0
16.0–16.4				2																	1			3
15.5–15.9								2										2						4
15.0–15.4												1												1
14.5–14.9							2	1									1							4
14.0–14.4		1	1			1																1		4
13.5–13.9	1	1	1		1	2	1	1	1		1		1		1		2				1			15
13.0–13.4		4	1		2	1		2										2			1			13
12.5–12.9		1	1		1		1		1	1						2	1	1			1	1		12
12.0–12.4			2					2				1	1					3			3	1		13
11.5–11.9		1				4	1					1						5				1		13
11.0–11.4		2					1					1						1						5
10.5–10.9								2										1						3
10.0–10.4		2					2	1	1														2	8
9.5– 9.9	1	2		3		1		1	2									2			1			13
9.0– 9.4	1	2	1	2	1	1	1		1			1					1	1						13
8.5– 8.9	1		2	1	1	1	1		2		1	3		1				5						19
8.0– 8.4	1	4	1	2			1	2	1			1	1					2				2		18
7.5– 7.9	1	1	1	2			2		2				1					3						13
7.0– 7.4		1	1			1	1		1	1								1						7
6.5– 6.9		1							1													1		3
6.0– 6.4		1	2				1																	4
5.5– 5.9		1																						1
5.0– 5.4																								0
4.5– 4.9																								0
4.0– 4.4																								0
3.5– 3.9																1								1
Total	6	24	14	12	6	13	15	14	13	2	2	9	4	1	1	3	5	31	0	0	8	7	2	193

TABLE 389.—*Variables: Performance scale score × military organization. Group VIII: Established white organizations.*

For men who took performance scale.

Performance scale scores.	Infantry headquarters company.	Infantry rifle company.	Infantry supply company.	Infantry machine-gun company.	Artillery headquarters company.	Artillery battery.	Artillery supply company.	Artillery trench mortar company.	Machine-gun battalion.	Engineers.	Field signal battalion.	Medical.	Military police.	Ammunition train.	Supply train.	Sanitary train ambulance company.	Sanitary train field hospital.	Development battalion.	Officers' training camp.	Nurses.	Camp base hospital.	Overseas base hospital.	Total.
Code No.	31	41	51	61	32	42	52	62	03	05	06	09	15	16	17	19	20	22	23	26	39	40	
260–269																		1					1
250–259									1														1
240–249																							0
230–239			1																				1
220–229			1														1						2
210–219																		1					1
200–209																1							1
190–199		1																					1
180–189																		6					6
170–179		2				2			1														5
160–169						1												2					3
150–159				1		1			3			2						5			1		13
140–149	1	3	2			1			1		2							1					11
130–139	1			1	1											2	1	8					14
120–129	2					1					1	2				2		4					12
110–119	1	4	5	1					3			3					1	8				1	27
100–109	2	3	2	1				1	1	1						1	1	5					18
90– 99	1	5								2		1				2	1	4					16
80– 89		8	2	4					2									3					19
70– 79	4		4	1								1			1			10				1	22
60– 69									1	1	1	1						9					13
50– 59	2	5							1							1		9					18
40– 49		2	2	1								2				1		7					15
30– 39		2	1	1				1				3						6					14
20– 29	1	1	1									1					1	1				1	7
10– 19		1										1						4					6
0– 9																		1					1
Total	15	37	21	11	1	6	0	2	14	4	4	17	0	0	7	6	4	95	0	0	1	3	248

TABLE 390.—*Variables: Point scale score × military organization. Group VIII: Established white organizations.*

For men who took point scale.

Point scale score.	Infantry headquarters company.	Infantry rifle company.	Infantry supply company.	Infantry machine-gun company.	Artillery headquarters company.	Artillery battery.	Artillery supply company.	Artillery trench mortar battery.	Machine-gun battalion.	Engineers.	Field signal battalion.	Medical.	Military police.	Ammunition train.	Supply train.	Sanitary train ambulance company.	Sanitary train field hospital.	Development battalion.	Officers' training camp.	Nurses.	Camp base hospital.	Overseas base hospital.	Total.
Code No.	31	41	51	61	32	42	52	62	03	05	06	09	15	16	17	19	20	22	23	26	39	40	.....
100	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
95–99	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0
90–94	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
85–89	.....	1	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	4
80–84	.....	2	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	5
75–79	1	.....	1	.....	.....	.....	.....	.....	.....	2	2	.....	.....	.....	.....	2	2	.....	.....	.....	.....	.....	10
70–74	.....	1	1	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
65–69	1	.....	1	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	.....	.....	.....	.....	7
60–64	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	5
55–59	1	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	4
50–54	.....	2	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
45–49	.....	1	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
40–44	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	2
Total	3	12	6	1	1	2	1	0	1	4	2	0	0	0	0	2	2	12	0	0	0	0	49

TABLE 391.—*Percentage distributions of letter grades for comparison of military organizations.*

Number of cases.	Organization.	A.		B.		C+.		C.		C−.		D.		D−.	
		All examinations.	Beta and individual.	All examinations.	Beta and individual.	All examinations.	Beta and individual.	All examinations.	Beta and individual.	All examinations.	Beta and individual.	All examinations.	Beta and individual.	All examinations.	Beta and individual.
18,891	Negro draft	0.1	.....	0.6	0.1	2.0	0.3	5.7	1.2	12.9	5.8	29.7	24.1	49.0	38.5
2,811	Negro infantry	.2	.....	.5	.2	2.0	1.3	15.3	12.0	18.9	15.3	47.0	42.1	16.3	15.6
1,975	Development battalion	2.9	.....	6.4	1.7	11.9	2.6	22.8	7.9	21.2	11.6	23.4	19.9	11.4	9.5
94,004	White draft	4.1	.1	8.0	.3	15.2	.9	25.0	3.0	23.8	7.9	17.0	11.5	7.1	4.9
1,092	Infantry supply company	3.4	.2	8.2	.4	17.8	1.0	26.0	1.1	22.8	4.7	14.7	8.6	6.6	3.2
1,998	Infantry rifle company	4.9	.3	11.3	.5	20.3	.5	28.6	2.4	18.7	3.9	12.2	6.8	3.8	1.9
1,170	Infantry machine-gun company	7.6	.1	14.7	.6	23.5	1.1	26.1	2.6	16.3	2.7	8.7	3.9	2.4	1.9
1,006	Infantry headquarters company	10.6	.5	17.1	.8	22.6	.9	22.3	1.5	15.9	4.0	6.6	3.6	4.7	2.6
995	Artillery supply company	5.3	.1	9.5	.1	19.3	.4	27.4	1.9	21.9	6.3	11.7	6.1	4.9	2.8
1,998	Artillery battery	7.9	.2	10.9	.3	21.2	.6	28.7	1.7	18.7	3.7	9.5	4.3	3.0	.9
426	Trench-mortar battery	4.7	.....	17.6	.....	19.3	.7	32.0	2.6	16.2	2.4	7.0	2.4	3.3	.9
973	Artillery headquarters company	12.0	.1	21.3	.4	22.8	.4	25.9	1.7	10.7	.9	5.7	2.8	1.6	.7
1,022	Medical detachment	9.4	.....	15.7	.5	21.4	.7	21.6	2.7	17.2	6.9	12.1	7.6	3.2	1.8
944	Ambulance company	10.1	.....	16.4	.3	23.1	1.0	23.2	1.5	17.6	2.7	8.0	2.9	1.8	.2
1,134	Overseas base hospital	12.5	.3	16.9	.9	22.2	1.2	22.4	4.1	13.9	6.6	9.8	7.2	2.8	1.8
875	Field hospital company	13.6	.....	18.8	.6	21.1	.5	24.0	2.6	16.3	7.6	5.4	2.9	.8	.5
1,169	Camp base hospital	15.2	.....	19.5	.3	23.6	.9	22.7	1.9	11.5	2.5	5.3	2.3	2.3	.5
Weighted.	Infantry	5.4	.3	11.7	.5	20.5	.8	27.9	2.3	18.6	3.9	11.8	6.5	4.0	2.0
1,007	Machine-gun battalion	8.4	.2	10.9	.3	22.8	.7	23.3	1.7	19.3	4.6	10.3	5.8	5.0	2.4
Weighted.	Artillery	7.7	.2	12.3	.3	21.0	.6	28.6	1.8	18.0	3.6	9.1	4.1	3.1	1.2
741	Engineers	9.7	.....	12.7	.5	22.8	1.1	26.1	2.4	14.3	3.2	8.5	3.0	5.9	.5
629	Supply train	5.9	.....	13.7	.....	26.6	.....	31.5	.3	15.0	.....	5.6	1.0	1.9	.6
642	Ammunition train	5.6	.....	11.2	.....	21.3	.....	29.5	1.6	16.1	2.2	8.3	3.6	5.1	1.6
618	Military police	10.4	.3	13.4	.2	19.1	.3	24.9	1.9	20.6	3.2	9.5	5.3	2.1	.5
Weighted.	Sanitary train	11.4	.....	17.3	.4	22.3	.8	23.5	2.0	16.5	4.6	7.0	2.9	1.9	.3
992	Field signal battalion	14.9	.....	25.9	.2	24.0	.....	21.1	.4	9.9	1.2	3.0	1.0	1.2	.5
420	Nurses	16.0	.....	28.6	.....	33.3	.....	18.3	.....	3.1	.....	.5	.....	.2	.....
2,014	Officers' training camp candidates	36.3	.....	33.9	.....	23.0	.....	5.7	.....	1.3	.....	.....	.....	.1	.....
15,385	Officers	55.9	.....	28.5	.....	12.5	.....	3.3	.....	.4	.....	.....	.....	.....	.....

Especially interesting are the increasing percentages of A and B grades inside regimental organizations of infantry and artillery as one passes from supply company through ordinary letter company or battery, machine-gun company or trench mortar battery, to headquarters company. In the medical department also similar expected increases appear as one passes from medical detachment through ambulance company and field hospital to the base hospital. The lower percentage of A and B grades in the overseas base hospital is unexpected. It may well be due partially to the fact that there were relatively poorer groups of men to pick from in the camps where the majority of the overseas base hospitals which were selected were made up. It may also be partially due to other factors governing the selection of men for overseas at those camps.

In the previous study of branches of the service made on the basis of the examining in the four original camps (Part II, loc. cit.) a comparison was made of six branches (infantry, machine gun, artillery, engineer, sanitary train, field signal battalion) on the basis of median scores and of percentage of A and B grades. The present study shows an increase over the former figures in the percentage of A and B grades in these branches of from 2.9 per cent in the engineers to 8 per cent in the case of the machine-gun battalions. The field signal battalions, however, show a decrease of 3 per cent. The general tendency toward an increase may perhaps be due to a lower norm in alpha than in examination *a*. The exceptional increase in the case of the machine-gun battalion may be due to the fact that in later times it was recognized that a considerably higher quality of man was needed for this special duty. It is noteworthy that the present comparison gives the same rank order among these six branches as was found in the previous study except for the single inversion of infantry and machine-gun battalion where the 8 per cent increase of the latter is responsible. The only other striking difference that now occurs is the increase by 10.1 per cent over the older findings with regard to percentage of A and B grades in the supply train. We have no information which would tend to explain this difference.

A large part of the divisions trained in the spring of 1918 at Camps Sheridan and Cody were examined after assignment from the depot brigade. At Camp Kearny at a later time men were assigned to organizations on the basis of a "table of psychological needs." This table was based upon a combination of the percentages of the various psychological grades obtained by the 10 best, 10 average, and 10 poorest men as selected in numerous organizations by their commanding officers. The rank order of the six branches is precisely the same in our present results as in the "table of psychological needs" at Camp Kearny. The actual percentages of A and B grades are somewhat higher at Camp Kearny. At Camp Sheridan the percentage of A and B men in the sanitary train was comparatively quite low, while at Cody the percentage of A and B men in machine-gun battalions was comparatively very high; otherwise there was close agreement, and the order of the branches was very similar to the one at which we have here arrived.

The intelligence ratings of officers of different branches of the service at the four original camps were discussed in Part II, pages 494 ff. Significant differences in median scores and in percentages of A and B grades were found to exist between different branches of the service. The combined rank order from highest to lowest obtained through this treatment of results from all four camps combined was: Engineers, Field Artillery, Infantry, Quartermaster Corps, Medical Corps, Dental Corps, Veterinary Corps.

The principal Hollerith sample for officers by branch of service is exhibited in tables 392 to 396. Table 397 was derived therefrom to show again the percentages of the different grades in various branches. Figure 59 presents the chief results of table 397 in graphic form. Calculation on the basis of the percentage of A and B grades gives exactly the same rank order in the seven branches mentioned. The percentages of A and B grades were approximately 7 to 18 per cent less with examination *a* than with alpha. This is probably due chiefly to the more rigorous and exacting norms used in the former examination. The additional branches of the service now considered are also of interest where any considerable number of cases is given.

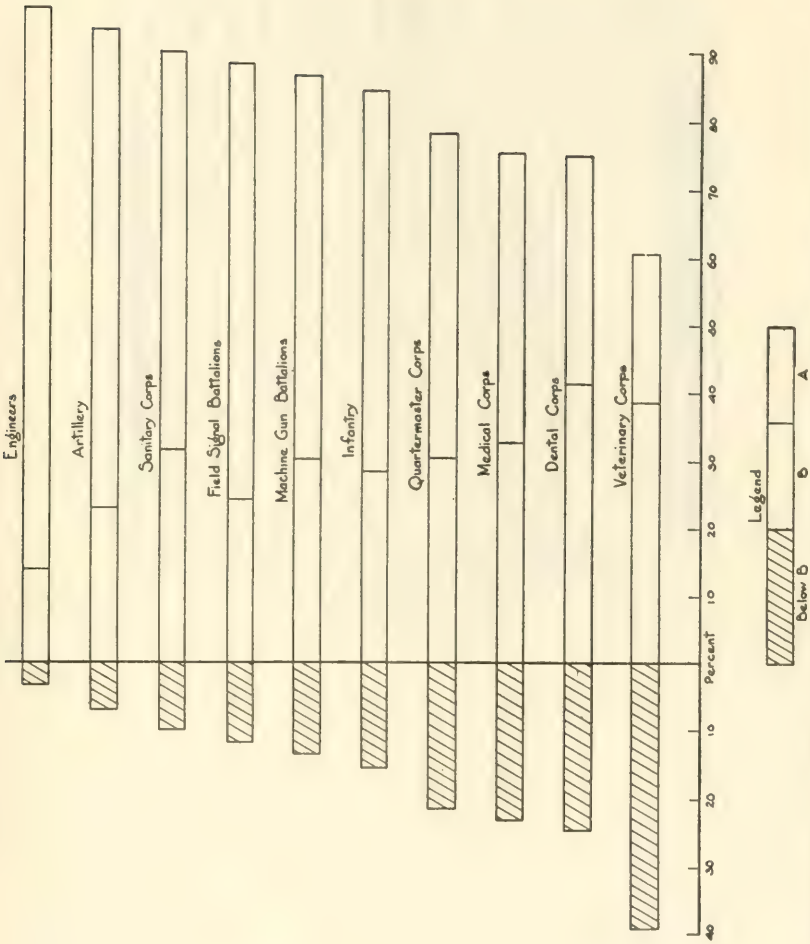


FIG. 59.—Percentages of A and B grades and of grades below B received by officers in different branches of the service. Alpha examination only. In connection with this chart consider figure 58.

TABLE 392.—*Variables: Alpha score ×, military organization. Group VI: White officers, second lieutenants only.*

For second lieutenants who took alpha only.

Alpha score.	Infantry.	Artillery.	Machine gun battalion.	Engineers.	Signal corps.	Quartermaster Corps.	Medical Corps.[1]	Dental Corps.[2]	Veterinary Corps.	Sanitary Corps.	Chaplains and school for chaplains.	Total.
Code No.	01	02	03	05	06	08	09	10	11	12	14	.....
205–212	.....	1	.....	3	.....	.....	.....	.....	.....	1	.....	5
200–204	.....	2	1	.....	3	.....	.....	.....	.....	.....	.....	6
195–199	35	7	2	13	.....	5	.....	.....	.....	2	.....	64
190–194	42	8	7	11	5	4	.....	.....	.....	2	.....	79
185–189	64	23	2	24	6	5	.....	.....	2	.....	.....	126
180–184	80	34	8	30	10	5	.....	.....	.....	.....	.....	167
175–179	109	35	8	25	9	14	.....	.....	.....	4	.....	204
170–174	140	57	5	38	9	13	.....	.....	2	2	.....	266
165–169	174	52	18	37	11	17	.....	.....	.....	5	.....	314
160–164	192	59	22	28	9	11	.....	.....	1	7	.....	329
155–159	208	47	19	32	16	18	.....	.....	2	4	.....	346
150–154	225	57	13	40	12	24	.....	.....	4	4	.....	379
145–149	229	57	11	25	11	25	.....	.....	4	3	.....	365
140–144	195	49	19	24	7	28	.....	.....	9	2	.....	333
135–139	221	56	13	15	10	17	.....	.....	4	1	.....	337
130–134	199	55	14	17	9	27	.....	.....	10	1	.....	332
125–129	151	38	23	9	5	15	.....	.....	10	3	.....	254
120–124	214	36	15	4	7	25	.....	.....	12	3	.....	316
115–119	158	33	14	3	4	16	.....	.....	17	.....	.....	245
110–114	134	22	5	5	2	9	.....	.....	6	2	.....	185
105–109	123	15	9	3	4	22	.....	.....	8	1	.....	185
100–104	94	10	4	4	1	9	.....	.....	10	.....	.....	132
95– 99	90	18	6	2	3	12	.....	.....	15	2	.....	148
90– 94	69	9	6	1	.....	10	.....	.....	8	.....	.....	103
85– 89	59	9	3	.....	1	9	.....	.....	9	.....	.....	90
80– 84	40	8	4	2	1	9	.....	.....	8	1	.....	73
75– 79	36	6	4	.....	1	4	.....	.....	7	1	.....	59
70– 74	25	3	1	1	.....	8	.....	.....	5	1	.....	44
65– 69	31	3	2	.....	1	1	.....	.....	2	.....	.....	40
60– 64	8	.....	2	.....	.....	6	.....	.....	3	.....	.....	19
55– 59	14	.....	.....	1	.....	4	.....	.....	1	.....	.....	20
50– 54	5	1	.....	.....	.....	3	.....	.....	4	.....	.....	13
45– 49	4	.....	.....	.....	.....	1	.....	.....	1	.....	.....	6
40– 44	2	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	3
35– 39	3	.....	1	.....	.....	2	.....	.....	.....	.....	.....	6
30– 34	2	.....	1	.....	.....	1	.....	.....	.....	.....	.....	4
25– 29	1	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	2
Total	3,376	810	262	397	157	380	0	0	165	52	0	5,599

[1] No second lieutenants in Medical Corps.
[2] No second lieutenants in Dental Corps.

TABLE 393.—*Variables: Alpha score × military organization. Group VI: White officers, first lieutenants only.*

For first lieutenants who took alpha only.

Alpha score.	Infantry.	Artillery.	Machine-gun battalion.	Engineers.	Signal corps.	Quartermaster Corps.	Medical Corps.	Dental Corps.	Veterinary Corps.	Sanitary Corps.	Chaplains and School for Chaplains.	Total.
Code No.	01	02	03	05	06	08	09	10	11	12	14	.....
205–212	4	1	.....	1	.....	.....	.....	.....	.....	.....	1	7
200–204	3	1	.....	3	.....	.....	1	.....	.....	1	.....	9
195–199	15	5	.....	8	.....	1	2	.....	.....	1	1	33
190–194	22	9	4	6	2	.....	10	.....	.....	.....	4	57
185–189	43	12	3	13	2	.....	17	1	.....	.....	6	97
180–184	68	15	4	15	6	3	31	2	.....	1	4	149
175–179	80	25	4	25	1	4	49	4	.....	2	9	203
170–174	94	34	5	22	4	13	49	7	.....	1	6	235
165–169	83	35	12	26	4	6	65	8	1	1	4	245
160–164	133	26	9	20	7	14	74	11	2	1	6	303
155–159	134	29	12	15	6	13	87	12	1	.....	8	317
150–154	156	39	8	17	9	5	98	15	4	2	5	358
145–149	149	37	9	20	5	12	95	22	5	2	6	362
140–144	127	33	10	12	7	10	98	23	3	.....	2	325
135–139	133	24	13	13	3	10	110	27	3	1	2	339
130–134	131	27	20	15	10	12	113	29	4	4	9	374
125–129	111	19	4	8	5	14	111	22	5	.....	2	301
120–124	115	10	8	5	7	14	110	26	9	.....	7	311
115–119	85	15	5	8	7	4	119	29	2	1	2	277
110–114	91	15	4	7	2	10	99	20	6	.....	3	257
105–109	69	8	7	7	4	6	96	33	.....	2	1	233
100–104	65	3	4	3	2	7	88	16	2	.....	1	191
95–99	64	1	3	3	5	2	73	17	5	1	1	175
90–94	43	2	1	2	2	7	67	11	2	1	.....	138
85–89	37	.....	4	1	2	5	46	11	2	1	.....	109
80–84	39	1	2	1	2	9	47	15	2	.....	.....	118
75–79	19	1	2	2	2	3	38	8	.....	.....	1	76
70–74	18	2	.....	.....	.....	2	20	2	.....	.....	1	45
65–69	13	.....	2	.....	1	2	25	6	1	.....	.....	50
60–64	14	1	1	.....	1	2	21	2	2	.....	.....	44
55–59	10	2	.....	.....	.....	1	14	3	1	.....	.....	31
50–54	9	1	.....	.....	1	.....	19	.....	.....	.....	.....	30
45–49	5	.....	.....	1	1	1	12	3	.....	.....	.....	23
40–44	5	.....	.....	.....	.....	.....	3	.....	.....	.....	.....	8
35–39	1	.....	.....	.....	.....	2	5	.....	.....	.....	.....	8
30–34	2	.....	.....	.....	1	.....	3	.....	.....	.....	.....	6
25–29	1	.....	.....	.....	.....	.....	1	1	.....	.....	.....	3
20–24	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
15–19	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1
Total	2,193	433	160	279	111	194	1,916	387	62	23	92	5,850

TABLE 394.—*Variables: Alpha score × military organization. Group VI: White officers, captains only.*

For captains who took alpha only.

Alpha score.	Infantry.	Artillery.	Machine-gun battalion.	Engineers.	Signal corps.	Quartermaster Corps.	Medical Corps.	Dental Corps.	Veterinary Corps.	Sanitary Corps.	Chaplains and School for Chaplains.	Total.
Code No.	01	02	03	05	06	08	09	10	11	12	14	.....
205–212	.....	.....	.....	1	.....	.....	.....	.....	.....	1	.....	2
200–204	1	.....	.....	4	2	1	.....	.....	.....	.....	.....	8
195–199	8	4	.....	7	1	1	4	.....	.....	.....	.....	25
190–194	16	3	.....	8	5	2	6	.....	.....	1	.....	41
185–189	27	10	3	18	.....	3	17	.....	.....	.....	.....	78
180–184	35	12	4	17	4	3	21	.....	.....	1	.....	97
175–179	40	7	4	15	1	4	21	.....	.....	1	.....	93
170–174	55	12	3	16	5	4	37	.....	.....	.....	.....	132
165–169	45	14	2	28	4	4	32	2	.....	1	.....	132
160–164	59	18	2	26	5	6	47	1	2	.....	.....	166
155–159	67	13	1	15	4	9	59	1	1	1	.....	171
150–154	58	19	3	10	3	7	52	1	3	5	.....	161
145–149	55	18	3	17	3	6	52	1	.....	.....	.....	155
140–144	66	18	3	12	2	9	63	2	1	1	.....	177
135–139	59	15	3	4	2	10	63	1	1	3	.....	161
130–134	69	12	2	10	4	9	57	.....	1	.....	.....	164
125–129	63	11	4	5	2	8	59	3	3	3	.....	161
120–124	43	10	6	6	1	6	71	1	1	.....	.....	145
115–119	56	2	3	2	2	5	61	3	2	.....	.....	136
110–114	51	9	.....	10	.....	8	58	1	1	3	.....	141
105–109	38	5	1	4	6	11	47	2	.....	.....	.....	114
100–104	52	7	2	3	2	11	41	.....	1	.....	.....	119
95– 99	26	.....	1	2	1	4	40	2	1	1	.....	78
90– 94	23	2	2	3	.....	5	24	2	3	.....	.....	64
85– 89	25	2	1	.....	3	4	29	1	.....	.....	.....	65
80– 84	19	2	2	.....	2	2	31	2	2	.....	2	64
75– 79	15	1	1	.....	1	2	23	.....	1	.....	.....	44
70– 74	11	.....	.....	.....	1	5	12	.....	.....	1	.....	30
65– 69	8	3	.....	.....	.....	1	15	.....	.....	.....	.....	27
60– 64	9	.....	.....	.....	.....	1	8	.....	.....	.....	.....	18
55– 59	7	1	2	.....	.....	.....	8	1	.....	.....	.....	19
50– 54	6	.....	1	.....	.....	.....	5	.....	.....	.....	.....	12
45– 49	5	.....	.....	.....	.....	.....	4	.....	.....	.....	.....	9
40– 44	2	.....	.....	.....	.....	.....	2	.....	.....	.....	.....	4
35– 39	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	2
30– 34	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	2
25– 29	.....	.....	.....	.....	.....	1	2	.....	.....	.....	.....	3
20– 24	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1
15– 19	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	2
Total	1,122	230	59	243	67	152	1,074	27	24	23	2	3,023

TABLE 395.—*Variables: Alpha score × military organization. Group VI: White officers majors only.*

For majors who took alpha only.

Alpha score.	Infantry.	Artillery.	Machine-gun battalion.	Engineers.	Signal corps.	Quartermaster Corps.	Medical Corps.	Dental Corps.	Veterinary Corps.	Sanitary Corps.	Chaplains and School for Chaplains.	Total.
Code No.	01	02	03	05	06	08	09	10	11	12	14	
195–199		1		1								2
190–194	4	1		6		1	2					14
185–189	2	3		4			2					11
180–184	6			6		1	8					21
175–179	7	1		5	1		10					24
170–174	5	1		6	1	1	8					22
165–169	10	1	1	11	2	3	7					35
160–164	13	3	1	9			15	1				42
155–159	11	1		3	2	2	11					30
150–154	13	3	1	7	1	1	7					33
145–149	9	1	2	5	1	2	11					31
140–144	4	2	1	7	2	3	14		1			34
135–139	11	2	2	2	2		14					33
130–134	9		2	3		2	9					25
125–129	6		2	1	1		7	2	1			20
120–124	8	2		5	1	4	7					27
115–119	7		1		1	1	7					17
110–114	14	1		1			5	2				23
105–109	5	2		2	1		7					17
100–104	6	3				1	3					13
95– 99	6			1		1	3	1				12
90– 94	3					1	4					8
85– 89	1	1			1		2					5
80– 84	5	1	1				1					8
75– 79	1					1						2
70– 74						1	1					2
65– 69					1							1
60– 64	1				1		1					3
55– 59												0
50– 54												0
45– 49	1											1
5– 9			1									1
Total	168	30	15	85	19	26	166	6	2	0	0	517

TABLE 396.—*Variables: Alpha score × military organization. Group VI: White officers officers above rank of major only.*

For officers above rank of major who took alpha only.

Alpha score.	Infantry.	Artillery.	Machine-gun battalion.	Engineers.	Signal corps.	Quartermaster Corps.	Medical Corps.	Dental Corps.	Veterinary Corps.	Sanitary Corps.	Chaplains and School for Chaplains.	Total.
Code No.	01	02	03	05	06	08	09	10	11	12	14	
200–204		1		1								2
195–199				1			1					2
190–194	1			2			1					4
185–189	1	1					2					4
180–184	4	1		1								6
175–179	6			2			2					10
170–174	3	3		3		1	1					11
165–169	4	2		2	1		1					10
160–164	1					1		1				3
155–159	1	2		3			1					7
150–154	5	1		1	1		1					9
145–149	5	1		2			3	1				12
140–144	7	1		1		1	3					13
135–139	5	1		1			1					8
130–134	8	2					1					11
125–129	8			1	1		1					11
120–124	5			1			2					8
115–119	2	1										3
110–114	2							1				3
105–109	3						1					4
100–104		2				1	1					4
95– 99	4											4
90– 94	1	1										2
85– 89	2											2
80– 84	0											0
75– 79	2											2
70– 74	1						1					2
65– 69	1											1
60– 64	1											1
Total	83	20	0	22	3	4	24	3	0	0	0	159

TABLE 397.—*Percentage distributions of psychological grades of white officers, arranged according to military organization (arm).*

Arm.	Number of cases.	Psychological grade.						
		D.	C−.	C.	C+.	B.	A	A and B.
Engineers	1,026	.....	.....	0.3	2.4	13.8	83.0	96.8
Field Artillery	1,523	.....	.....	1.1	5.9	23.0	70.0	93.0
Sanitary Corps	98	.....	.....	2.0	8.2	31.6	58.2	89.8
Field signal battalion	357	0.3	0.3	2.2	9.0	24.1	64.1	88.2
Machine-gun battalion	495	.....	.4	2.2	10.7	30.1	56.5	86.6
Infantry	6,942	.....	.3	3.0	12.2	28.5	56.0	84.5
Quartermaster	756	.....	.9	5.2	15.7	30.2	48.0	78.2
Medical	3,180	.....	.6	5.2	17.6	32.9	43.6	76.5
Dental	423	.2	.2	4.0	20.4	41.1	34.1	75.2
Veterinary	98	.....	.4	7.9	30.8	38.7	22.1	60.8

There is considerable variation among the different branches. The proportion of A's varies from 22 per cent in the Veterinary Corps to 83 per cent in the Engineers; the proportion of A's and B's combined from 61 per cent in the Veterinary Corps to 97 per cent in the Engineers, and the proportion of grades less than B from 0.3 per cent in the Engineers to 39.1 per cent in the Veterinary Corps. In the Engineers, Artillery, Sanitary Corps, field signal battalions, machine-gun battalions, and Infantry the proportion of A grades is above 50 per cent, and the proportion of A and B grades combined is above 80 per cent. The Engineers rate remarkably high, and the Artillery officers do nearly as well. On the other hand the ratings in the Medical Department, especially among the dental and veterinary officers, are strikingly low.

It should not be concluded from these data that, because of the varying proportions of high grades found in the different arms of the service, the Army was poorly organized. Indeed it might be that these very differences show organization on a high plane of efficiency, for it seems likely that the work to be done in some branches of the service requires a higher type of intellectual ability than is needed in the others.

In connection with table 397 and figure 59 a reservation should be made with regard to the Medical Department at least. The relation between intelligence rating and rank is discussed in detail in the following chapter. It is there made evident that in the Medical Corps, unlike other branches, higher officers stand significantly high, while captains and first lieutenants stand relatively low. It is the great number of captains and first lieutenants in the Medical Corps, therefore, that brings this Corps so far down in rank order, and it is not the medical officers of the higher grades which do so. The latter, indeed, secure grades slightly better than those secured by officers of equal rank in the other branches combined. (See Chap. 17, fig. 62.) Table 398, showing the percentage distribution of psychological grades by rank in the Engineers, Field Artillery, Infantry, and Medical Corps, also demonstrates that officers of the rank of major and above in the Medical Corps secure a greater percentage of A and B grades than do officers in the other corps mentioned, excepting the Engineers.

TABLE 398.—*Percentages of each letter grade secured by officers of various ranks in the Infantry, Field Artillery, Engineers, and Medical Corps.*

Rank.	Engineers.							Field Artillery.						
	D.	C−.	C.	C+.	B.	A.	Number of cases.	D.	C−.	C.	C+.	B.	A.	Number of cases.
Second lieutenant	.....	.....	0.6	2.6	10.4	86.7	397	.....	.....	0.9	7.3	24.6	67.0	810
First lieutenant	.....	.....	.4	4.4	18.0	77.7	279	.....	.....	1.4	1.8	21.7	75.2	433
Captain	.....	.....	.....	3.2	15.2	81.5	243	.....	.....	1.7	6.2	21.5	70.8	230
Major	.....	.....	.....	1.2	14.2	84.5	85	.....	.....	.....	16.7	16.7	66.5	30
Above major	.....	.....	.....	.....	9.2	90.8	22	.....	.....	.....	15.0	15.0	70.0	20

Rank.	Infantry.							Medical Corps.						
	D.	C−.	C.	C+.	B.	A.	Number of cases.	D.	C−.	C.	C+.	B.	A.	Number of cases.
Second lieutenant	.....	0.3	2.4	11.6	28.9	56.8	3,376	.....	.....	.....	.....	.....	.....	.....
First lieutenant	.....	.4	3.2	12.3	27.7	56.8	2,193	.....	0.7	5.7	18.8	33.6	40.9	1,916
Captain	.1	.4	3.7	14.1	28.5	52.8	1,122	.....	.7	4.7	17.5	32.6	44.5	1,074
Major	.....	.....	1.2	13.2	29.3	57.0	168	.....	.....	1.2	7.8	25.1	65.4	166
Above major	.....	.....	3.6	10.8	33.6	51.6	83	.....	.....	4.2	4.2	20.9	71.0	24

CHAPTER 17.

RELATION OF RANK TO INTELLIGENCE.

The degree of the dependence of rank upon intelligence rating may be taken to indicate approximately the extent to which intelligence is operative in selection for promotion. A complete comparison of ranks requires that both the commissioned and noncommissioned grades, in relation to enlisted men, be taken into account. In this study officers and enlisted men were grouped according to their rank—one rank to a group, except that the group of sergeants included sergeants, sergeants first class, and sergeant majors, and that, among the officers, a single group was made for "above major." The term "recruit" is used for a new man not so far along in his training as a private, but still far enough along to have undergone some selection beyond the draft and the depot brigade. Tables 399 to 405 present the figures concerning enlisted men obtained from the principal sampling for Hollerith analysis. Data presenting records for the officers will be found in tables 392–397 in the previous chapter.

TABLE 399.—*Variables: Alpha score × rank. Group VIII: Established organizations (white).*

For men who took alpha only.

Rank.	Code No.	Alpha score.																						
		0– 4	5– 9	10– 14	15– 19	20– 24	25– 29	30– 34	35– 39	40– 44	45– 49	50– 54	55– 59	60– 64	65– 69	70– 74	75– 79	80– 84	85– 89	90– 94	95– 99	100–104	105–109
Recruit	1	4	11	9	9	14	18	20	23	26	29	21	20	14	19	11	17	16	21	10	13	14	11
Private	2	56	116	122	305	349	457	447	502	545	584	637	637	608	639	590	559	576	546	551	489	485	423
Corporal	3	1	2	5	7	16	21	25	35	32	32	41	39	46	60	60	71	74	71	61	65	62	88
Sergeant; sergeant, first class; sergeant major	4	2	..	4	8	16	15	19	27	38	37	40	48	56	60	65	57	60	76	81	93	101	83
Total	.	63	129	140	329	395	511	511	587	641	682	739	744	724	769	726	704	726	714	703	660	662	605

Rank.	Code No.	110–114	115–119	120–124	125–129	130–134	135–139	140–144	145–149	150–154	155–159	160–164	165–169	170–174	175–179	180–184	185–189	190–194	195–199	200–204	205–212	Total number.
Recruit	1	12	8	12	11	11	5	7	7	5	2	3	2	5	4	1	2	..	....	..		447
Private	2	401	406	342	319	290	296	235	194	180	132	128	86	59	61	26	19	8	9	..	1	13,436
Corporal	3	75	59	54	50	58	35	44	36	36	19	18	11	15	10	4	3	....	2	....	....	1,443
Sergeant; sergeant, first class; sergeant major	4	93	78	66	77	94	77	82	70	40	45	41	28	23	17	8	8	1	3	1	....	1,838
Total	.	581	551	474	457	453	413	368	307	261	198	190	127	102	92	39	32	9	14	1	1	17,164

TABLE 400.—*Variables: Beta score × rank. Group VIII: Established organizations (white).*

For men who took beta only.

BETA SCORE.

Rank	Code No.	Beta score.																							Total number.
		1– 4	5– 9	10– 14	15– 19	20– 24	25– 29	30– 34	35– 39	40– 44	45– 49	50– 54	55– 59	60– 64	65– 69	70– 74	75– 79	80– 84	85– 89	90– 94	95– 99	100–104	105–109	110–114	
Recruit	1	..	1	3	10	14	11	19	9	8	6	4	6	7	2	1	1	..	..	..	1	1	....	....	93
Private	2	20	35	55	67	151	125	132	132	139	101	121	113	95	95	81	72	44	26	21	15	11	5	2	1,661
Corporal	3	....	....	....	....	....	....	....	1	..	2	2	..	4	3	....	1	3	....	2		..	1	3	22
Sergeant; sergeant, first class; sergeant major	4	....	....	....	....	....	....	....	....	1	..	3	..	2	1	..	..	2	2	....	....	1	....	....	12
Total		20	36	58	77	165	136	142	142	146	109	130	119	108	101	82	74	49	28	26	16	13	6	5	1,788

TABLE 401.—*Variables: Score on performance scale examination × rank. Group VIII: Established organizations (white).*

For men who took performance scale examination following alpha, following beta, following alpha and beta, or who took performance examination only.

Rank.	Code No.	Score on performance scale examination.																									Total number.
		10–19	20–29	30–39	40–49	50–59	60–69	70–79	80–89	90–99	100–109	110–119	120–129	130–139	140–149	150–159	160–169	170–179	180–189	190–199	200–209	210–219	220–229	230–239	240–249	250–259	
Recruit	1	1	....	....	2	[illegible]	2	6	4	....	1	4	....	....	....	1	....	....	....	....	....	....	....	....	....	....	23
Private	2	4	5	7	9	10	13	11	12	9	9	15	7	6	6	6	1	3	....	1	....	....	1	1	....	1	137
Corporal	3	....	....	....	....	....	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Sergeant; sergeant, first class; sergeant major	4	....	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	1
Total	....	5	5	8	11	12	15	17	17	9	10	19	7	6	6	7	1	3	....	1	....	....	1	1	1	....	162

TABLE 402.—*Variables: Score on point scale examination × rank. Group VIII: Established organizations (white).*

For men who took point scale examination following alpha, following beta, following alpha and beta, or who took point scale examination only.

Rank.	Code No.	Score on point scale examination.										Total number.
		45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	
Recruit	1	....	....	1	....	1	....	....	1	....	....	3
Private	2	3	2	[illegible]	4	[illegible]	2	8	[illegible]	2	1	28
Corporal	3	....	....	....	....	....	....	....	....	....	....	....
Sergeant; sergeant, first class; sergeant major	4	....	....	....	....	....	....	....	....	....	....	....
Total	....	3	2	3	4	3	2	8	3	2	1	31

TABLE 403.—*Variables: Mental age on Stanford-Binet examination × rank. Group VIII: Established organizations (white).*

For men who took Stanford-Binet examination following alpha, following alpha and beta, following beta only, or who took Stanford-Binet examination only.

Rank.	Code No.	Mental age Stanford-Binet examination.																									Total number.
		5.5–5.9	6.0–6.4	6.5–6.9	7.0–7.4	7.5–7.9	8.0–8.4	8.5–8.9	9.0–9.4	9.5–9.9	10.0–10.4	10.5–10.9	11.0–11.4	11.5–11.9	12.0–12.4	12.5–12.9	13.0–13.4	13.5–13.9	14.0–14.4	14.5–14.9	15.0–15.4	15.5–15.9	16.0–16.4	16.5–16.9	17.0–17.4	17.5–17.9	
Recruit	1	....	....	....	....	....	2	1	....	2	....	....	....	1	....	2	....	....	....	....	....	....	....	....	....	....	8
Private	2	1	3	3	6	8	11	13	7	11	2	2	1	8	8	4	6	9	2	....	1	....	3	....	1	2	112
Corporal	3	....	....	....	....	....	....	....	....	1	....	....	....	1	....	....	1	1	....	....	....	....	....	....	....	....	4
Sergeant, sergeant, first class; sergeant major	4	....	....	....	....	....	....	....	1	....	....	....	1	....	....	....	....	....	1	1	....	....	....	....	....	....	4
Total	....	1	3	3	6	8	13	14	8	14	2	2	2	10	8	6	7	10	3	1	1	....	3	....	1	2	128

TABLE 404.—*Variables: Alpha score × rank. Group VIII: Established organizations (white).*

For men who took alpha only, or alpha and beta, or alpha and an individual examination, or alpha, beta, and an individual examination.

Rank.	Code No.	Alpha score.																									
		0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109
Recruit	1	5	13	10	14	23	24	26	29	27	29	22	20	14	19	11	18	16	21	10	13	15	11
Private	2	95	189	222	332	371	469	457	517	554	595	638	640	609	631	591	562	576	546	551	489	486	423
Corporal	3	4	2	14	8	17	21	25	35	33	33	42	39	46	61	60	71	74	71	61	65	62	88
Sergeant; sergeant, first class; sergeant major.	4	2	3	8	[illegible]	16	15	19	28	38	37	40	48	56	60	65	57	60	76	81	93	101	84
Total	....	106	207	254,	362	427	529	527	609	652	694	742	747	725	771	727	708	726	714	703	660	664	606

Rank.	Code No.	110–114	115–119	120–124	125–129	130–134	135–139	140–144	145–149	150–154	155–159	160–164	165–169	170–174	175–179	180–184	185–189	190–194	195–199	200–204	205–212	Total number.
Recruit	1	12	8	12	11	11	5	7	7	5	2	3	2	5	4	1	2	....	....	....	....	487
Private	2	403	437	342	319	290	296	235	194	180	132	128	86	59	61	26	19	8	9	....	1	13,768
Corporal	3	75	59	54	50	58	35	44	36	36	19	18	11	15	10	4	3	....	2	....	....	1,461
Sergeant, sergeant, first class; sergeant major.	4	93	78	66	77	95	77	82	70	40	45	41	28	23	17	8	8	1	3	1	....	1,848
Total	....	583	582	474	457	454	413	368	307	261	198	190	127	102	92	39	32	9	14	1	1	17,564

TABLE 405.—*Variables: Beta score × rank. Group VIII: Established organizations (white).*

For men who took beta only, or alpha and beta only, or beta with an individual, or alpha, beta, and an individual examination.

BETA SCORE.

Rank.	Code No.	Beta score.																									Total number.
		0–4	5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85–89	90–94	95–99	100–104	105–109	110–114	115–118	
Recruit	1	6	11	10	14	18	14	11	12	12	8	9	11	13	6	4	3	...	...	...	1	1	1	1	...	169
Private	2	37	74	119	123	176	144	159	152	163	128	137	133	115	116	99	86	54	30	33	19	12	5	4	...	2,118
Corporal	3	1	...	...	1	...	...	...	1	1	3	2	3	6	4	...	1	5	1	2	1	...	1	3	...	36
Sergeant; sergeant, first class; sergeant major.	4	...	...	1	...	...	...	1	...	2	2	4	...	2	2	1	...	2	2	1	1	...	...	...	...	21
Total	...	44	85	130	138	194	158	174	165	178	141	152	147	136	128	104	90	61	33	36	21	14	7	8	...	2,344

Of considerable importance is the question as to how many selective factors besides rank enter into the figures here presented. It is not likely that peculiarities of particular camps at which the men were examined brought about any great degree of selection; as, for instance, in the case of the enlisted men the intelligence records were selected so as to include a proportional number of men of each rank from each camp. It has already been shown in chapter — that the camp has little to do with the standing of the officers except in the cases where all the officers from a camp are in the same arm. Age probably does not cause much selection among the enlisted men because correlational studies show that there is very little change in the scores made by the men between the ages of 20 to 30. In the case of the officers, some of the figures may be influenced by the fact that the Medical Department has a great many older men, but as these are later separated for other reasons, the selection does not operate in the final figures.

The distribution of intelligence ratings by rank is shown in table 406. For the officers the ratings are based on the score made in alpha, but, since the enlisted men did not all take the same examination, the grades assigned to them are those made on alpha, beta, or individual examinations, according to the following plan:

Examination.	Basis of rating.
Alpha only	Alpha score.
Alpha and beta	Beta score.
Beta only	Beta score.
Alpha and individual	Individual score.
Beta and individua	Individual score.
Alpha, beta, and individual	Individual score.
Individual only	Individual score.

TABLE 406.—*Percentages of intelligence ratings by rank for white draft, white enlisted men and white officers.*

Intelligence rating.	White draft.	Recruit.	Private.	Corporal.	Sergeant.[1]	Second lieutenant.	First lieutenant.	Captain.	Major.	Above major.
A	4.1	7.4	9.3	16.1	24.0	59.4	51.7	53.4	64.4	63.6
B	8.0	11.1	14.6	26.2	26.5	27.1	29.7	29.0	25.0	25.1
C+	15.2	14.7	21.2	27.7	25.4	10.9	13.8	14.4	9.2	8.9
C	25.0	20.7	25.8	19.3	16.8	2.4	3.7	3.8	1.5	2.5
C−	23.8	21.1	16.1	8.7	5.8	0.2	0.5	0.4	0.2	...
D	17.0	15.6	9.7	1.8	1.5	...	...	0.1	...	...
D−	7.1	9.5	3.9	0.6	0.5	...	...	...	...	...
Per cent who took beta	29.7	28.0	14.3	2.7	1.6	...	...	...	...	...
Number of cases	94,004	620	15,647	1,482	1,863	5,590	5,908	3,023	517	159

[1] The group of sergeants includes sergeants, sergeants first class, and sergeants major.

It is at once clear that there is a high positive correlation between the rank and the intelligence rating of the enlisted men, and that the officers as a group rate much higher than the enlisted men. The relationship among the officers of the various ranks is not so clear.

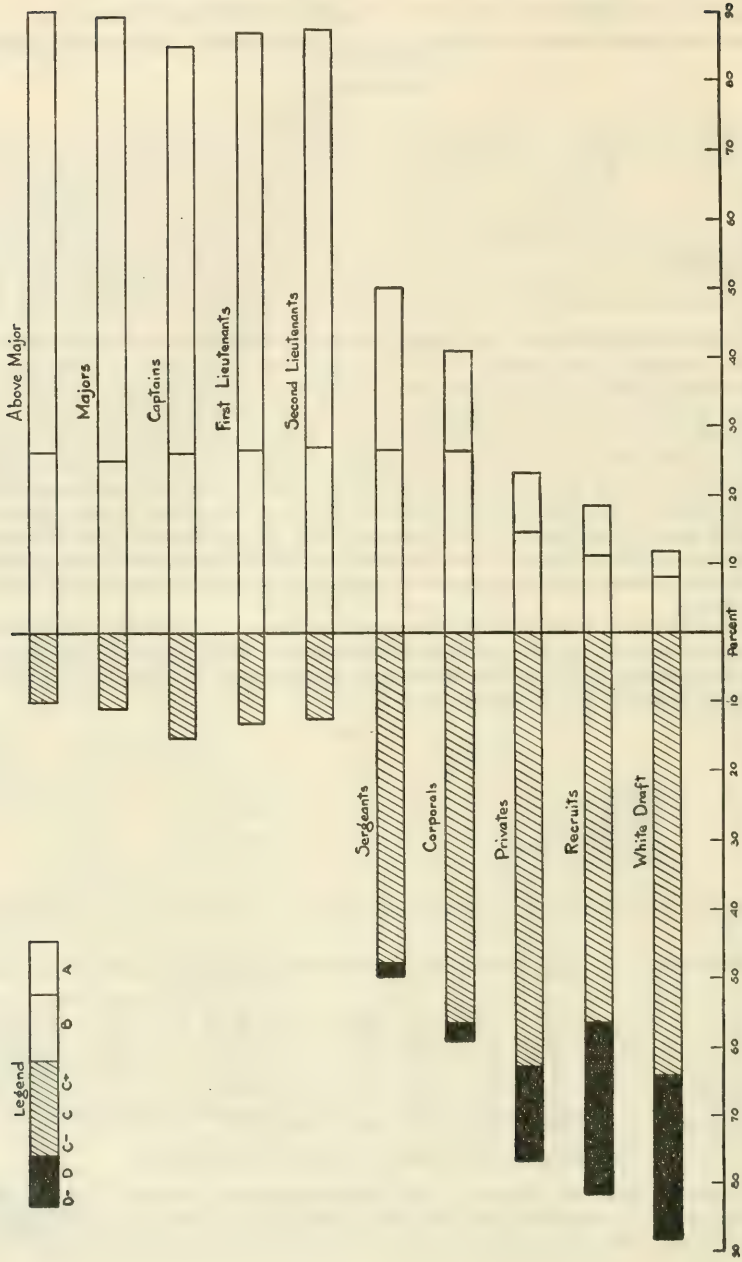


FIG. 60. Percentages of various intelligence ratings made by different ranks of enlisted men, except officers of the Medical Department. Based on tables 406 and 407.

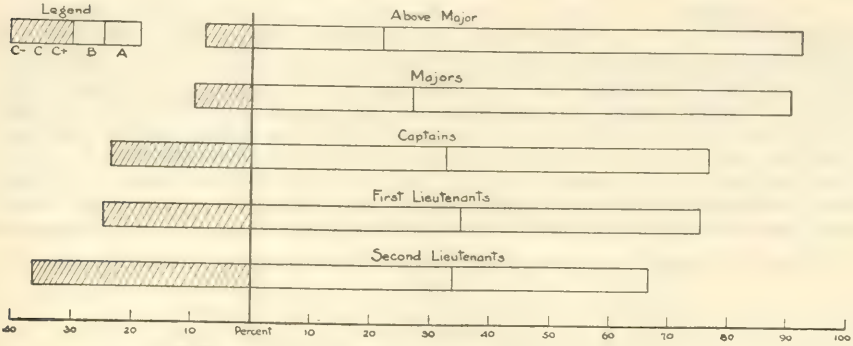


FIG. 61. Percentages of various intelligence ratings made by officers of the Medical Department of different ranks. Based on table 408.

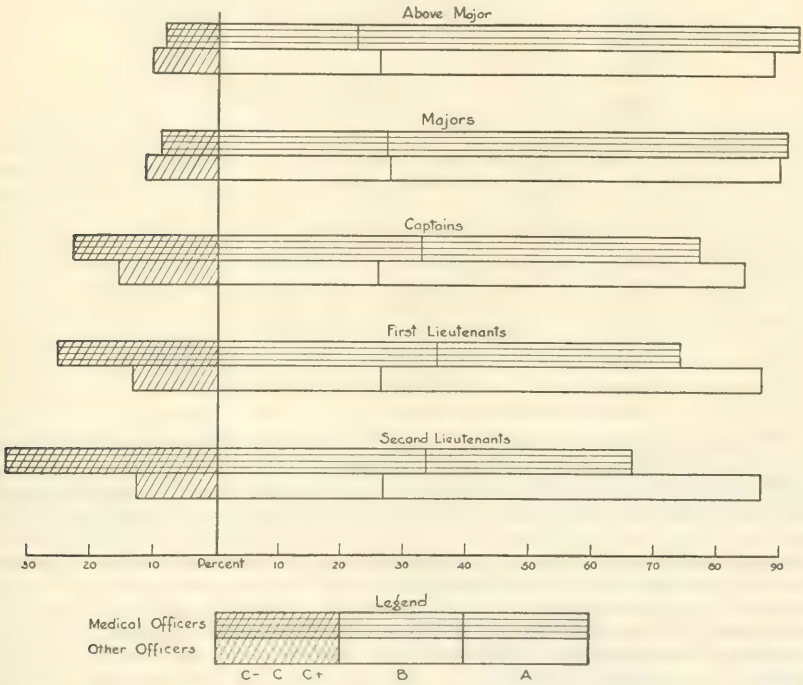


FIG. 62. Comparison of the percentages of various intelligence ratings made by officers of the Medical Department and ratings made by officers of other branches of the service. Based on tables 407 and 408.

The table shows that the majors rate a little higher than the officers of any other rank, although the officers of the rank of lieutenant colonel or higher are not very far below the majors. Next in order come the second lieutenants, then the first lieutenants, and finally the captains. The second lieutenants, majors, and higher officers stand above the average of the combined group; the first lieutenants and captains, below it.

The irregularity in the ratings of the officers is due, it appears, to the inclusion of the medical officers with the others. Officers of the Medical Department grade lower than the officers of any other branch of the service (v. infra). There are no second lieutenants in either the Medical Corps or the Dental Corps, and this fact caused the percentage of high grades to be greater among the second lieutenants and less among the first lieutenants than would otherwise have been the case. Of the first lieutenants and captains used in this study more than one-third are from the Medical Department; these two ranks rate low. In view of these facts table 407 has been prepared in which ratings of medical officers are omitted. figure 60 presents the facts shown in table 407, together with the data concerning the enlisted men; figure 61 and table 408 present the same data for the officers of the Medical Department.

TABLE 407.—*Percentages of intelligence ratings by rank of white officers except officers in Medical Department.*

11,100 CASES.

Intelligence rating.	Second lieutenant.	First lieutenant.	Captain.	Major.	Above major.
A	60.4	60.8	58.5	64.9	61.8
B	26.9	26.4	25.9	24.7	26.0
C+	10.1	10.3	12.1	9.9	10.0
C	2.3	2.5	3.2	1.2	.3
C−	.3	.4	.3	.3	.....
D	.....	.1	.1	.....	.....
D−	.....	.....	.....	.....	.....
A and B	87.3	87.2	84.4	89.6	87.8
Number of cases	5,382	3,371	1,874	342	131

TABLE 408.—*Percentages of intelligence ratings by ranks of white officers in the Medical Department only.*

3,955 CASES.

Intelligence rating.	Second lieutenant.	First lieutenant.	Captain.	Major.	Above major.
A	30.0	40.1	44.1	63.9	70.5
B	33.7	35.2	32.9	27.1	22.3
C+	28.1	19.0	17.8	8.0	3.7
C	7.9	5.4	4.7	1.1	3.7
C−	.5	.5	.5	.....	.....
D	.....	.....	.1	.....	.....
D−	.....	.....	.....	.....	.....
A and B	66.7	75.3	77.0	91.0	92.8
Number of cases	217	2,389	1,148	174	27

The mean alpha scores for the various ranks (exclusive of the medical officers), together with the probable errors, are shown in table 409, while in table 410 are presented the ratios of the differences between means to the probable errors of the differences. These ratios indicate that the differences are mathematically significant (the chances of the difference being reversed varies from 75 per cent to 0.1 per cent; in 3 cases out of 10 it is less than 33 per cent); the absolute size of the difference (maximal 5.4 points), however, is not of psychological significance. There is no assurance that a significant difference of five points or less on the scale of alpha represents a psychological fact and not an artifact. Thus it appears that there are at most only slight differences according to rank among the officers outside the Medical Department. The captains fall a little below the first and second lieutenants, but the differences are hardly significant. On the whole it seems safe to say that among the officers outside the Medical Department intelligence differences according to rank were, at the time and under conditions of the testing, of no psychological significance. The percentages of A and B grades from table 407 support this conclusion.

Among the officers of the Medical Department the situation is quite different. Table 408 and figure 61 show a considerable agreement between rank and intelligence rating. A noticeable fact, when one considers, for example, the percentage of A and B grades, is that there is little difference between the first lieutenants and the captains, but that there is a relatively

great difference between the captains and the majors. Apparently the low rating of the medical officers is due to the fact that the captains and first lieutenants who score low keep the average of the entire Medical Department down. The higher ranking officers make slightly better records than the higher officers of the other branches of the service combined; the majors and higher officers in the Medical Corps rate higher than officers of like rank in the Infantry and Artillery, and are surpassed only by the Engineers.

TABLE 409.—*Means of the alpha scores of the officers according to rank.*

Officers of the Medical Department not included in these figures.

Statistical measurement.	Second lieutenant.	First lieutenant.	Captain.	Major.	Above major.
Mean	141.7	139.5	139.4	137.7	143.1

TABLE 411.—*Means of the alpha scores of medical officers according to rank.*[1]

Statistical measurement.	Second lieutenant.	First lieutenant.	Captain.	Major.	Above major.
Mean	114.5	125.0	127.8	141.9	150.8

The high standing of the medical officers above the rank of captain is probably explained by the fact that in the Medical Department the officers are called upon to perform duties very closely resembling their work in civil life, and a man can be ranked when he enters the service according to his professional standing and placed at once in a position for which he is approximately fitted. In the other branches of the service the most of the men are called upon to do many things much outside their training and experience, so that regardless of their intellectual ability they have to spend considerable time in learning their military duties; thus rank must of necessity depend to a large extent on the length of time they have actually been in the Army. Moreover, the Medical Department is the only one in which men were commissioned in great numbers direct from civil life without a try-out at an officers' training camp. This procedure presumably accounts for the low standing of the junior officers in the Medical Department as well as for the fact that the senior officers are better placed according to ability. It is possible that such branches of the service as ordnance or chemical warfare would show the same state of affairs were the data at hand.

Table 413 shows for enlisted men the relationship of intelligence rating and rank to the type of examination taken (whether alpha or beta). The significant thing is that as the rank increases the percentage of men who take beta decreases; at the same time there is an increase in the percentage of men getting the higher grades.

TABLE 413.—*Percentages of men taking alpha and beta, and percentages making A or B in each of these examinations, for 16944 enlisted men by grades.*

Rank.	Men taking examination alpha only.		Men taking examination beta, alone or with alpha, or with an individual examination.		Total number of men.
	Per cent with A or B.	Per cent taking alpha only.	Per cent with A or B.	Per cent taking beta.	
Sergeant	59.3	98.9	0.2	1.6	444
Corporal	41.8	97.7	0.5	2.7	233
Private	23.4	86.3	0.5	14.3	15,617
Recruit	17.4	72.1	1.1	28.8	629

[1] Tables 410 and 412 are omitted.

CHAPTER 18.

OFFICERS' TRAINING CAMPS AND NONCOMMISSIONED OFFICERS' SCHOOLS.

Systematic psychological examination of the officers' training schools began with the camps of the third series. Few camps had psychological staffs at this time, so examiners were sent out, each examiner to test the men in several camps. In this way approximately 1,500 men were tested in 22 different schools. Examination *a* was used in this testing exclusively.

Table 414 shows the distribution of letter grades in the individual camps and table 415 presents the same facts on a percentage basis, together with median scores. Figure 63 expresses diagrammatically facts shown in table 415 with the camps arranged in order of the number of A and B grades obtained. There is a wide range of variation both in the median scores and in the percentage of A and B grades. There are four times as many A grades made in Devens as in Bowie or in Oglethorpe. If the camps are divided into two groups, the grade D is three times as frequent in the lower as in the upper half. In the main, the southern camps rank much lower than those of the North. Camp Wadsworth is the only exception to this rule.

TABLE 414.—*Distribution of letter grades in the individual officers' training camps of the third series.*

Camp.	E.	D.	C.	B.	A.	A and B.	Total.
Devens			117	208	474	682	799
Wadsworth		1	35	63	93	156	192
Grant		3	103	167	245	412	518
Dodge			111	156	200	356	467
Custer		1	147	237	219	456	604
Taylor		2	125	201	159	360	487
Sherman		1	147	160	186	346	494
Funston		2	161	211	151	362	525
Upton		4	267	284	298	582	853
Dix		1	62	73	57	130	193
Meade		2	240	217	254	471	713
Jackson		1	108	100	111	211	320
Lee		3	211	199	175	374	588
Doniphan		1	156	162	103	265	422
Travis		2	193	180	114	294	489
Hancock		1	192	174	111	285	478
McClellan		1	195	151	111	262	458
Pike		1	276	207	147	354	631
Gordon		2	278	174	135	309	589
Bowie		2	230	172	73	245	477
Stanley		26	1,792	1,093	630	1,723	3,541
Oglethorpe	1	9	579	339	180	519	1,108
All camps	1	66	5,725	4,928	4,226	9,154	14,946

TABLE 415.—*Percentage distribution of letter grades and median alpha scores in the individual officers' training camps of the third series.*

Camp.	E.	D.	C.	B.	A.	A and B.	Median score.	Number of cases.
Devens			15	26	59	85	312	799
Wadsworth			18	33	48	81	298	192
Grant		1	20	32	47	79	296	518
Dodge			24	33	43	76	288	467
Custer			24	39	36	75	285	604
Taylor			26	41	32	73	281	487
Sherman			30	32	38	70	281	494
Funston			31	40	29	69	274	525
Upton			31	33	35	68	276	853
Dix			32	38	30	68	274	193
Meade			34	30	36	66	279	713
Jackson			34	31	35	66	278	320
Lee		1	36	34	30	64	269	588
Doniphan			37	38	24	62	265	422
Travis			40	37	23	60	263	489
Hancock			40	36	23	59	261	478
McClellan			43	33	24	57	260	458
Pike			44	33	23	56	260	631
Gordon			47	30	23	53	255	589
Bowie			48	36	15	51	252	477
Stanley		1	51	31	18	49	248	3,541
Oglethorpe		1	51	33	16	49	245	1,108
All camps		.5	38.4	33.2	28.4	61.6	273	14,946

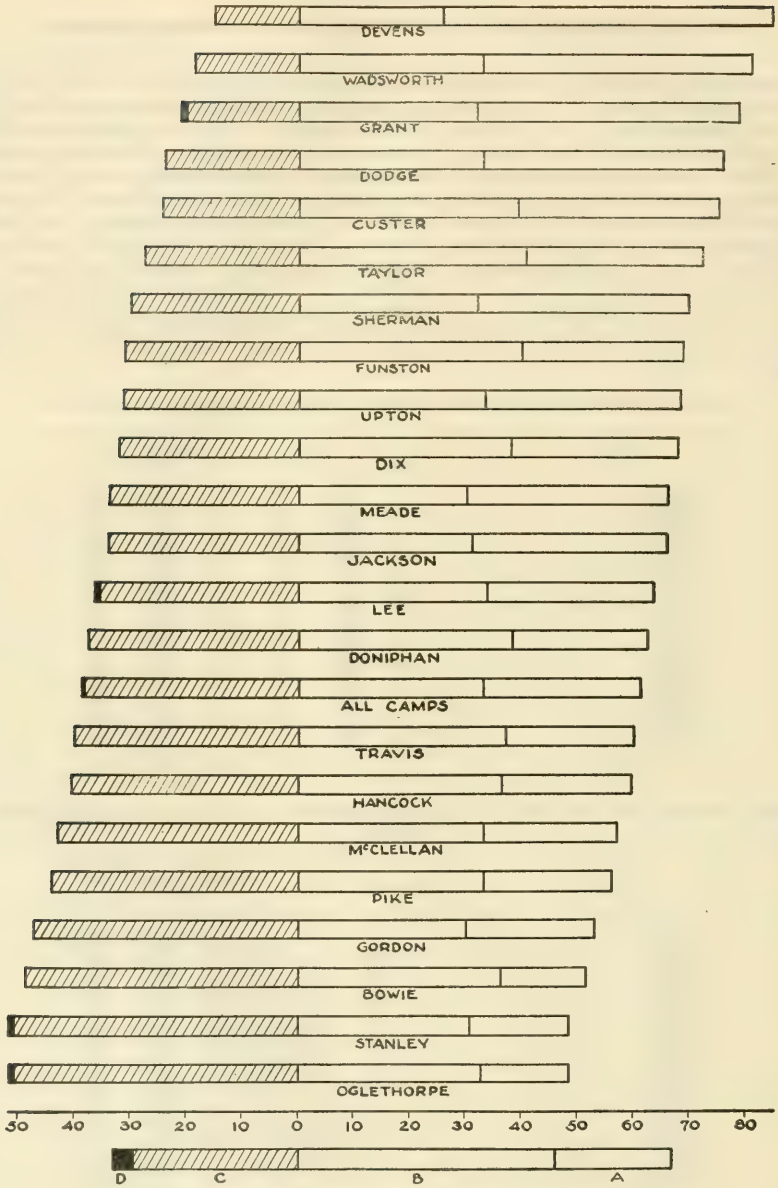


FIG. 63. Percentage distribution of letter grades for individual officers' training camps of third series.

The following figures make possible comparison of the intelligence rating of students in the officers' training group with enlisted men and with officers.

Military group.	Men.	Points.
Median score for officers' training groups	11,346	273
Median score for drafted or enlisted men	63,292	163
Median score for officers of four National Army divisions	1,649	291

According to these figures the average intelligence of the students in the third series of officers' training schools is considerably lower than that for officers in the four National Army divisions which had been examined at the time when these figures were obtained. According to the figures in table 415 the median score for the officers in the National Army divisions is exceeded by the median score of only 3 out of the 22 officers' training school groups, namely, those at Devens, Wadsworth, and Grant. This seems to indicate that the student officers in the third series of training schools are inferior to the first and second training schools in intelligence. However, since the men in the training schools were not all given commissions, it may be possible that the intelligence of the group which is successful will be as high as that of the groups already commissioned.

The results obtained in the examination of the fourth series of officers' training camps are set forth in tables 416 and 417 and in figure 64. In examining these camps examination alpha was used and the results were expressed in weighted scores. These examinations were also given after the adoption of the C+ and the C− grades.

The range of differences between camps is even greater in the fourth series than in the third. In Camp Lewis nearly twice as many men made grades A and B as in Wheeler and the number of A's made at Lewis is three times as great as the number made at Wheeler. There is still present the tendency of the southern camps to stand low in the list.

TABLE 416.—*Distribution of letter grades in the individual officers' training camps of the fourth series.*

Camp.	E.	D.	C−.	C.	C+.	B.	A.	Total.
Bowie	1		3	52	135	212	126	529
Cody		1	1	13	68	101	75	259
Custer	4	1	13	53	197	358	368	994
Devens			1	5	27	109	235	377
Dodge			3	29	137	344	411	924
Funston				1	10	29	31	71
Grant	2		11	42	139	292	302	788
Kearny				15	94	233	196	538
Jackson			3	16	40	48	33	140
Lewis				7	42	341	382	772
Meade		2	1	21	83	173	219	499
Pike	2	4	12	90	221	283	227	839
Shelby	1	3	15	60	134	170	114	497
Sherman					3	6	9	18
Sheridan		1		3	20	101	193	318
Taylor			1	15	77	226	264	583
Travis			3	39	91	165	96	394
Wheeler		1	14	72	161	157	81	486
All camps	10	13	81	533	1,679	3,348	3,362	9,026

TABLE 417.—*Percentage distribution of letter grades and median alpha scores in the individual officers' training camps of the fourth series.*

Camp.	E.	D.	C−.	C.	C+.	B.	A.	A and B.	Median score.	Number of cases.
Lewis				0.9	5.4	44.1	49.5	93.6	269	772
Sheridan		0.3		.9	6.3	31.8	60.7	92.5	285	318
Devens			0.3	1.3	7.2	29.0	62.4	91.4	284	377
Funston				1.4	14.1	40.9	43.6	84.5	258	71
Taylor			2	2.6	13.2	38.7	45.3	84.0	265	583
Sherman					16.7	33.3	50.0	83.3	269.5	18
Dodge			3	3.1	14.8	37.2	44.5	81.7	262	924
Kearny				2.8	17.5	43.3	36.4	79.7	252	538
Meade		.4	2	4.2	16.7	34.7	43.9	78.6	261	499
Grant	0.3		1.4	5.3	17.6	37.1	38.3	75.4	253	788
Custer	.4	1	1.3	5.3	19.8	36.0	37.0	73.0	252	994
Cody		.4	.4	5.0	26.2	39.0	29.0	68.0	239	259
Travis			.8	9.9	23.0	41.9	24.3	66.2	232	394
Bowie	.2		.6	9.8	25.5	40.1	23.8	63.9	230	529
Pike	.2	.5	1.4	10.7	26.4	33.8	27.0	60.8	229	839
Jackson			2.1	11.4	28.5	34.3	23.6	57.9	225	140
Shelby	.2	.6	3.0	12.1	27.0	34.2	23.0	57.2	222	497
Wheeler		.2	2.9	14.8	33.1	32.3	16.6	48.9	209	486
All camps	.1	.1	.9	5.9	18.6	37.0	37.2	74.2	249	9,026

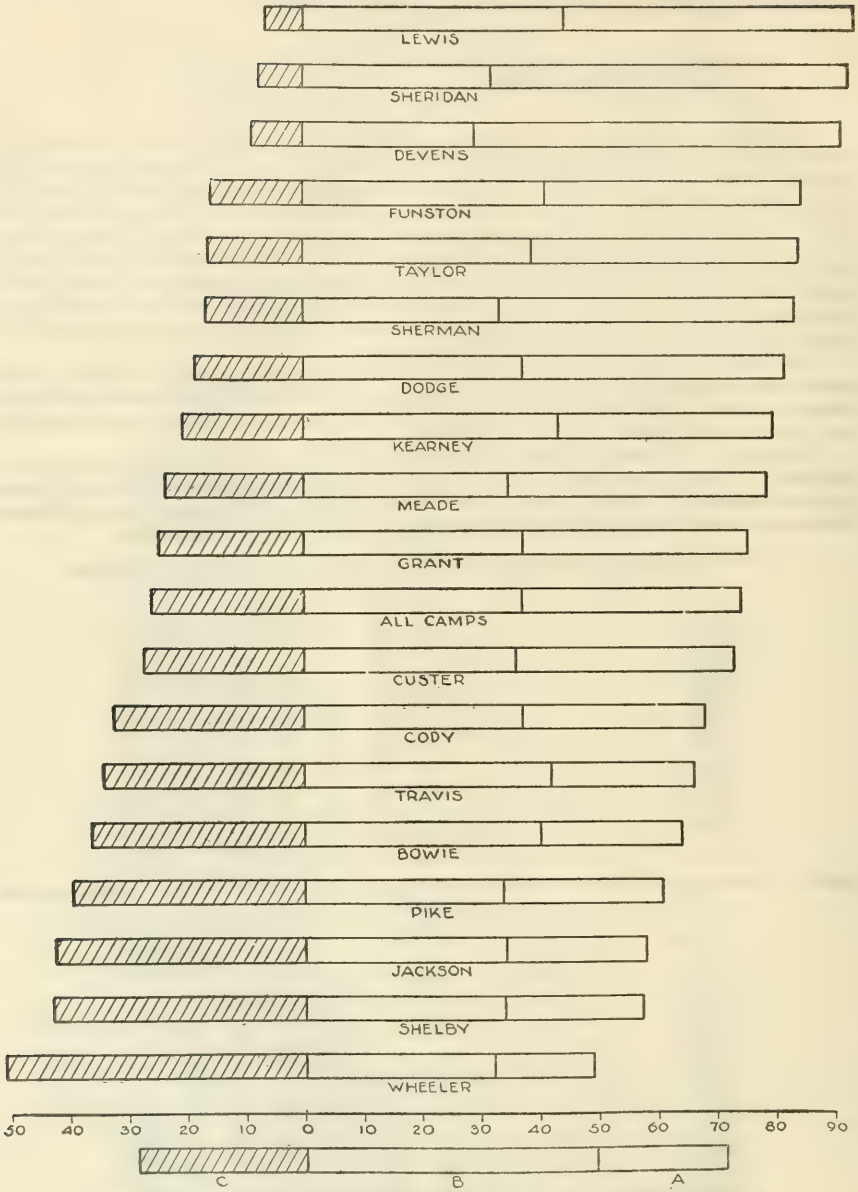


FIG. 64. Percentage distribution of letter grades for individual officers' training camps of the fourth series

Table 418 shows the comparative rank order of those schools of which records appear in both series. There is some tendency for camps to remain at the same level. Four camps remain in the same quartile and two of these are in exactly the same position in both series. Six camps move one quartile only, and only two camps move as much as two quartiles. The last four camps in the list, which are all located in the South, seem to form a homogeneous group among themselves.

TABLE 418.—*Comparison of rank order of camps of third and fourth series officers' training schools; rank based on percentage of A and B grades combined.*

Third series officers' training schools.			Fourth series officers' training schools.		
Rank.	Camp.	Per cent A and B grades.	Rank.	Camp.	Per cent A and B grades.
1	Devens	85	1	Devens	91.4
2	Grant	79	2	Funston	84.5
3	Dodge	76	3	Taylor	84.0
4	Custer	75	4	Sherman	83.3
5	Taylor	73	5	Dodge	81.7
6	Sherman	70	6	Meade	78.6
7	Funston	69	7	Grant	75.4
8	Meade	66	8	Custer	73.0
9	Jackson	66	9	Travis	66.2
10	Travis	60	10	Bowie	63.9
11	Pike	56	11	Pike	60.8
12	Bowie	51	12	Jackson	57.9

After the fourth series of officers' training schools a consolidation of the work took place. Four central officers' training schools for infantry were established at Camps Lee, Pike, MacArthur and Grant. There were also other schools for training officers in other branches of the service. Classes were started in these schools every month, and in most of the camps psychological examinations were given to each class soon after its entrance to the school. Examination alpha was used.

The data concerning the results of this testing appear in table 419 and consist of some 2,000 records chosen in the principal sampling from the four infantry schools, records of 917 candidates in the machine-gun school at Camp Hancock, of 1,099 men in the training school for engineering officers at Camp Humphreys, and of 261 men in the chaplains' school at Camp Taylor.

Two points should be held in mind in examining these data. In the first place, the psychological ratings were used to a large extent in the selection of candidates for the schools of the fifth series and few men were admitted to the schools if their rating fell below C. There are also a great many men who took the examination at the school for the second or even the third time. It is possible that this last fact does not affect greatly the letter grade of the man but it may make a slight difference in the percentage of A and B grades obtained by the group.

TABLE 419.—*Percentage distribution of letter grades for groups of officers' training camps of the fifth series.*

Group.	E, D−, D.	C−.	C.	C+.	B.	A.	A, B.	Number of cases.
Infantry School (Group VIII, principal sample)	0.2	1.1	5.6	22.5	31.6	36.4	71.0	2,015
Machine-Gun School, Camp Hancock	.....	3	3.3	10.9	26.2	59.3	85.5	917
Engineering Officers' Training School, Camp Humphreys	.....	3	2.5	7.0	22.3	67.5	88.8	1,099
Chaplains' School, Camp Taylor	.....	.....	1.5	8.5	21.6	65.6	90.2	261
White officers (Group VI, principal sample)	.....	3	3.2	12.5	25.5	55.6	84.1	15,385
White draft (Groups I, II, III, principal sample)	24.1	.....	25.0	17.1	8.0	4.1	12.1	94,004

As shown in table 419, all the candidates do a little better than the officers selected by the principal sampling. The difference, however, is slight and not significant.

On the basis of the percentage of A and B grades obtained, the candidates of the fifth series do much better than those of the third and fourth series. This comparison is hardly valid, however, because of the selection of candidates on the basis of intelligence rating as mentioned

above. There had also been a revision of the examination which made it easier to obtain ratings of A and B. For discussion of this last point, see Part II, page 342.

Several studies were made concerning the relationship of intelligence rating to success in the officers' training schools. One of the best of these was made at Camp Lee with data obtained from the class graduating in October, 1918. The results of this study are shown in table 420. Men are classified according to their success in the school. Those who were commissioned immediately upon graduation were put into the first group. In the second group are the men held for one month additional training. In the third group are those held for two months' additional training. The fourth group consists of those who failed at the end of the course, and the fifth group are those dismissed before their course was finished. An examination of the median scores shows that there were differences between the levels of intelligence of these different groups. The difference between the median of 115 in the group of men failing and the median of 131 made by the men commissioned immediately at the end of the course is significant. The relative success of men in the several intelligence groups indicates that the A men have five times as much chance as the C− men of getting commissions at the end of the course and nearly seven times as much chance of getting commissions eventually. The B and C+ men have six times as much chance of success as C− men. The D men have practically no chance at all. This relationship between intelligence rating and success is very high when we consider the other qualities besides intelligence which must be considered in deciding whether or not a man is fit to become an officer.

TABLE 420.—*Relation of intelligence rating to success in officers' training school; 1,072 cases reported from Camp Lee, fifth series officers' training school.*

Letter grade and score.		Commissioned.	Held for 1 month additional training.	Held for 2 months' additional training.	Failed at end of course.	Dismissed during course.	Total.
A	195–199	2					2
	190–194	1	3			2	6
	185–189	4		1			5
	180–184	3	4			2	9
	175–179	11	3		2	7	23
	170–174	9	3		3	7	22
	165–169	24	4	1	7	8	44
	160–164	14	9	2	6	8	39
	155–159	21	7		3	4	35
	150–154	17	2		6	13	38
	145–149	26	8	5	4	7	50
	140–144	33	9	6	4	14	66
	135–139	31	3	2	5	15	56
B	130–134	27	13	2	6	14	62
	125–129	21	12	4	1	18	56
	120–124	18	10	2	9	17	56
	115–119	31	14	2	7	12	66
	110–114	16	11	3	9	17	56
	105–109	28	10	4	10	18	70
	100–104	20	7	3	5	21	56
C+	95–99	17	4		3	12	36
	90–94	9	8	2	6	11	36
	85–89	19	4	1	6	13	43
	80–84	12	3	2	5	13	35
	75–79	4	6	2	6	5	23
C	70–74	11	3		2	10	26
	65–69	2	6		1	7	16
	60–64	4	2		1	5	12
	55–59				1	3	4
	50–54		1		2	4	7
	45–49	2	1		2	1	6
C−	40–44				1	1	2
	35–39	1			1	3	5
	30–34					1	1
	25–29					2	2
D	20–24					1	1
	15–19						
Number of cases		438	170	44	124	296	1,072
Median		131	122	126	115	115	123
Per cent A men		49.7	14.0	4.3	10.1	22.1	
Per cent B men		38.7	19.2	4.6	11.5	26.4	
Per cent C+ men		35.6	14.0	4.4	13.5	33.0	
Per cent C men		26.8	18.3		12.7	42.2	
Per cent C− men		10.0			20.0	70.0	
Per cent D men						100.0	

Data concerning the intelligence ratings made in several noncommissioned officers' schools are presented in tables 421 and 422. These schools show a poorer selection than the officers' training schools, as is to be expected, since the men are what might be termed second choice.

Here again we find wide differences between the quality of the men in different camps, but in all cases the candidates rate better than the draft. Tables 423 and 424 present data showing the relation of success in nine commissioned officers' schools to intelligence ratings. At both Greenleaf and Hancock the men graduating as sergeants score a larger percentage of A and B grades than the others, and the corporals do much better than unsuccessful men. Only a small per cent of C− and D men were given warrants of any sort.

TABLE 421.—*Distribution of letter grades made by students in several noncommissioned officers' training schools.*

Group.	E, D−.	D.	C−.	C.	C+.	B.	A.	Total.
Bowie	1	9	41	47	52	26	4	180
Greenleaf	1	6	41	89	182	137	85	541
Hancock	0	23	94	180	101	52	17	467
Humphreys	14	27	85	169	160	148	124	727
Meade (first school)	2	12	29	49	27	21	5	145
Meade (Development Battalion School)	3	27	35	55	37	12	11	180
Total	21	104	325	589	559	396	246	2,240

TABLE 422.—*Percentage distribution of letter grades made by students in several noncommissioned officers' training schools.*

Group.	E, D−.	D.	C−.	C.	C+.	B.	A.	A, B.	Number of cases.
Bowie	.6	5.0	22.8	26.2	28.8	14.4	2.2	16.6	180
Greenleaf	.2	1.1	7.6	16.5	33.6	25.3	15.7	41.0	541
Hancock	.....	4.9	20.2	38.4	21.6	11.1	3.6	14.7	467
Humphreys	1.9	3.7	11.7	23.2	22.1	20.3	17.0	37.3	727
Meade (first school)	1.3	8.2	20.0	33.6	18.6	14.5	3.4	17.9	145
Meade (Development Battalion)	1.6	15.7	19.5	30.6	20.6	6.6	6.1	12.7	180
All combined	.9	4.7	14.4	26.2	25.0	17.6	11.0	28.6	2,240
White draft	7.1	17.0	23.8	25.0	15.2	8.0	4.1	12.1	94,004
Infantry Officers' Training School (fifth series)	.....	.2	1.1	5.6	22.5	34.6	36.4	71.0	2,015
Corporals	.6	1.8	8.7	19.3	27.7	26.2	16.1	42.0	1,482
Sergeants	.5	1.5	5.8	16.8	25.4	26.5	24.0	50.5	1,863

TABLE 423.—*Percentage distribution of intelligence ratings of men in the noncommissioned officers' training school at Camp Greenleaf, according to success in the school.*

Grade received on graduation.	E, D−.	D.	C−.	C.	C+.	B.	A.	A, B.	Number of cases.
Sergeants	.....	.....	0.5	9.5	26.0	36.0	28.0	64.0	176
Corporals	0.3	0.3	7.0	18.5	41.0	23.0	10.0	43.0	195
Unsuccessful	.....	.....	19.0	21.0	33.0	17.0	10.0	27.0	170

TABLE 424.—*Percentage distribution of intelligence ratings of the noncommissioned officers' school at Camp Hancock, according to success in the school.*

Grade for which recommended.	E, D−.	D.	C−.	C.	C+.	B.	A.	A and B.	Number of cases.
Sergeants	...	0.8	8.2	32.6	27.6	22.6	8.2	30.8	123
Corporals	.	4.7	9.3	22.8	43.6	16.8	4.7	21.5	214
Failing	....	9.4	37.0	36.2	13.8	3.1	.8	3.9	130

CHAPTER 19.

DATA FROM COLLEGES AND THE STUDENTS' ARMY TRAINING CORPS.

Data resulting from giving the alpha examination to the Students' Army Training Corps and to the college groups are of interest as bearing upon the approximate intelligence of such groups and, conversely, of the position of these groups on the scale of alpha scores. They show, further, the results obtained from the revision of procedure for the use of the Students' Army Training Corps (see Part I, page 200). Accordingly it seems desirable to present a number of comparisons based on such data as are available.

Caution is necessary in the interpretation of the figures in the tables. It is by no means certain that the values given are typical of the groups which they are supposed to represent. The institutions from which the figures were obtained will be seen to be largely the smaller schools and colleges from the West and South. Few data are at hand from the larger universities, and the records suggest that inclusion of figures from a number of large universities of high standing would materially raise the medians and the percentage of the higher ratings.

Again, it can not be stated with any certainty that the groups to which the examinations were given were truly representative of the institutions. There are from Brown University, for instance, records of only 210 men. This group is such a small proportion of the total registration that the chances are very much against its being representative. At some of the institutions the tests were given only to those who volunteered to take them, a procedure which introduces a factor of selection that we have no means of measuring. Sometimes the records were obtained from only one class. Such a limitation probably gives a selected group; the figures from the University of Illinois show distinct class differences.

A third factor making for variability in the results is the fact that tests were given under widely varying conditions and by many examiners, most of whom were untrained. While the chances of variations from this source are not large, yet the possibility of such variations must be held in mind while examining the figures.

Table 425 shows the distribution of alpha scores in several of the larger groups, and table 426 the median scores, quartiles, and percentages of A and B grades for the groups listed in table 425. There are wide differences between these groups. The medians vary from 111 for the normal school women to 130 for the college men, and the percentage of A and B grades combined for the same groups varies from 57.4 to 75.2. None of the groups make a record as good as that of the Army officers chosen for the principal sampling for Hollerith analysis, but all groups rate higher than the Army sergeants, who made 50 per cent A and B grades. The men of the Students' Army Training Corps and the Reserve Officers' Training Corps seem to offer good material for the selection of officers for the Army.

In table 427 an analysis is made of the records of five units of the Students' Army Training Corps which included more than a hundred men. Here again wide differences are apparent.

Two of the groups of the Reserve Officers' Training Corps were made up of more than a hundred men each, and these two groups are compared in table 428. There is a difference of 10 points in the median scores and a difference of 18.5 per cent in the number of A and B grades obtained.

The figures for various groups of college men are presented in table 429. Here the differences are even more striking, for the medians range all the way from 80 to 150, while the percentages of A and B grades run from 17.4 to 95.5. Several colleges present here a better record than that made by the white officers in the principal sampling.

The data for the women from various colleges (table 430) again emphasize the differences between institutions. The variations are not so great as they were in the case of the college men, but they are large enough to be of significance.

None of the normal schools reported records of enough men to make a study of the differences worth while, but the fact that there are large differences between normal schools as well as between colleges is shown in table 431, which gives the results of four groups of normal-school women.

In table 432 the division is by sex. While the median scores made by the women are in every case a few points lower than the median scores for the men in similar groups, the differences are so small that they may be regarded as insignificant. The same statement may be made regarding the percentage of A and B grades combined. The men tend toward a higher proportion of A grades.

As the figures sent in by the University of Illinois were grouped according to the department of study, it was possible to investigate intelligence differences between the various departments. These data are set forth in table 433. As would be expected, the graduate students rate considerably higher than the students in the undergraduate departments, but this is the only difference of importance. The very slight drop for the students of agriculture is probably not significant.

Differences between the men in the four years of college were also obtained from the Illinois data, and the results of this study are shown in table 434. There is a slight but definite increase in the percentage of higher grades with the longer stay at college, presumably as the result of the elimination of poorer men by the ordinary collegiate process.

TABLE 425.—*Distributions of alpha scores for various groups from higher educational institutions.*

Alpha score.	15 Students' Army Training Corps (men).	3 Reserve Officers' Training Corps (men).	20 colleges (men).	4 normal schools (men).	13 colleges (women).	7 normal schools (women).	All colleges (men and women).
205–212	.....	.....	5	.....	.....	.....	5
200–204	4	.....	7	.....	.....	.....	7
195–199	10	1	11	.....	1	.....	12
190–194	11	1	12	2	4	3	16
185–189	29	4	38	0	5	1	43
180–184	55	2	41	1	13	3	54
175–179	79	9	66	1	16	4	82
170–174	103	12	92	4	38	10	130
165–169	137	8	99	2	36	4	135
160–164	141	22	123	3	69	8	192
155–159	152	26	175	3	62	17	237
150–154	189	24	183	4	88	17	271
145–149	188	29	180	4	83	19	263
140–144	202	37	199	10	98	33	297
135–139	204	35	188	6	98	28	286
130–134	197	37	189	13	109	35	298
125–129	193	45	184	7	98	45	282
120–124	179	44	175	7	98	46	273
115–119	178	41	158	15	99	44	257
110–114	166	37	133	8	92	56	225
105–109	130	34	131	7	78	41	209
100–104	123	29	131	9	75	49	206
95– 99	97	35	95	6	79	35	174
90– 94	83	24	84	12	71	37	155
85– 89	76	27	78	7	45	32	123
80– 84	52	17	86	3	35	35	121
75– 79	49	16	60	3	32	27	92
70– 74	36	18	44	7	22	26	66
65– 69	18	18	43	3	11	22	54
60– 64	27	13	34	5	8	8	42
55– 59	15	2	42	1	4	9	46
50– 54	11	5	28	4	0	11	28
45– 49	4	5	16	1	1	3	17
40– 44	5	2	9	2	3	7	12
35– 39	1	2	11	0	2	5	13
30– 34	1	0	11	2	2	1	13
25– 29	1	1	10	0	.....	2	10
20– 24	.....	0	2	0	.....	.....	2
15– 19	.....	1	2	0	.....	.....	2
10– 14	.....	.....	.....	1	.....	.....	.....
5– 9	.....	.....	.....	.....	.....	.....	.....
0– 4	.....	.....	.....	.....	.....	.....	.....
Total	3,146	663	3,175	163	1,575	723	4,750

TABLE 426.—*Median alpha scores, quartiles, and percentages of A and B grades made by various groups from higher educational institutions.*

Educational group.	Median.	Lower quartile.	Upper quartile	Per cent A grades.	Per cent A and B grades.	Number of cases.	Number of institutions.
College men	139	105	154	44.8	75.4	3,175	20
College women	127	106	142	38.8	75.8	1,575	13
College men and women combined	127	105	150	42.8	75.4	4,750	22
Students' Army Training Corps men	133	111	153	48.0	81.1	3,146	15
Reserve Officers' Training Corps men	121	97	141	31.6	67.6	663	3
Normal school men	115	85	135	24.5	59.5	163	5
Normal school women	111	90	130	20.4	57.4	723	7
White officers, principal sample	139	116	161	55.6	84.1	15,385	.....

TABLE 427.—*Median alpha scores, quartiles, and percentages of A and B grades made by various Students' Army Training Corps groups.*

Students' Army Training Corps.	Median.	Lower quartile.	Upper quartile.	Per cent A grades.	Per cent A and B grades.	Number of cases.
Dartmouth	147	132	165	70.6	94.5	595
Case School, Cleveland	145	125	161	63.0	90.4	472
University of California	135	116	153	50.0	84.0	621
University of Texas	126	109	141	38.0	78.4	717
College of Wooster, Ohio	124	104	144	34.8	73.7	208
15 Students' Army Training Corps, combined	133	111	153	48.0	81.1	3,146
White officers, principal sample	139	116	161	55.6	84.1	15,385

TABLE 428.—*Median alpha scores, quartiles, and percentages of A and B grades made by various Reserve Officers' Training Corps groups.*

Reserve Officers' Training Corps.	Median.	Lower quartile.	Upper quartile.	Per cent A grades.	Per cent A and B grades.	Number of cases.
The Citadel, Charleston, S. C.	125	107	144	37.6	77.8	222
Virginia Polytechnic Institute	115	89	135	24.2	59.3	368
3 Reserve Officers' Training Corps, combined	121	97	141	31.6	67.6	663
White officers, principal sample	139	116	161	55.6	84.1	15,385

TABLE 429.—*Median alpha scores, quartiles, and percentages of A and B grades made by various groups of college men.*

College men.	Median.	Lower quartile.	Upper quartile.	Per cent A grades.	Per cent A and B grades.	Number of cases.
Massachusetts Agricultural College	150	135	164	74.2	95.5	154
Rutgers	138	131	163	69.4	94.0	358
Brown University	142	125	160	61.4	88.5	210
Colorado College	142	126	162	57.4	88.5	148
Johns Hopkins freshmen	137	116	155	53.0	85.0	140
Notre Dame	137	116	152	53.6	82.6	321
University of Minnesota freshmen	129	109	142	42.4	79.9	534
Southern Methodist University	127	108	146	42.1	79.3	162
University of Idaho	125	107	145	38.8	76.6	277
University of Florida	120	87	144	30.2	66.9	215
Lincoln Memorial, Tennessee	86	56	121	8.2	36.4	171
Atlanta Southern Dental College	80	57	95	7.0	17.4	184
20 colleges combined	130	105	154	44.8	75.4	3,175
White officers, principal sampling	139	116	161	55.6	84.1	15,385

TABLE 430.—*Median alpha scores, quartiles, and percentages of A and B grades made by various groups of college women.*

College women.	Median.	Lower quartile.	Upper quartile.	Per cent A grades.	Per cent A and B grades.	Number of cases.
Colorado College	142	125	156	61.2	89.8	178
University of Minnesota freshmen	128	109	145	40.5	78.8	354
University of North Dakota	129	107	153	44.0	77.0	117
State Teachers' College, Colorado	122	100	141	32.4	75.8	266
Southern Methodist University	123	102	141	32.8	70.6	159
University of Idaho	117	99	139	29.8	68.6	169
13 colleges combined	127	106	142	38.8	75.8	1,575

TABLE 431.—*Median alpha scores, quartiles, and percentages of A and B grades made by various groups of normal-school women.*

Normal-school women.	Median.	Lower quartile.	Upper quartile.	Per cent A grades.	Per cent A and B grades.	Number of cases.
First District, Missouri	124	112	140	37.0	83.8	111
Peru, Nebraska	122	103	143	35.2	72.9	162
Mellensville, Pennsylvania	117	98	129	16.4	67.2	140
Sam Houston, Texas	88	71	105	4.2	24.9	236
7 normal schools combined	111	90	130	20.4	57.4	723

TABLE 432.—*Intelligence ratings according to sex.*

Sex.		Colorado College.	University of Minnesota freshmen.	Southern Methodist University.	University of Idaho.	Colleges combined.	Normal schools combined.
Median	Men	142	129	127	125	130	115
	Women	142	128	122	117	127	111
Quartile deviation	Men	18	17	19	19	25	25
	Women	16	19	20	20	18	20
Per cent A grades	Men	57.4	42.4	42.1	38.8	44.8	24.5
	Women	61.2	40.3	32.8	29.8	38.8	20.4
Per cent A and B grades	Men	88.5	79.9	79.3	78.6	75.4	59.5
	Women	89.8	78.8	70.6	68.6	75.2	57.4
Number of cases	Men	148	534	162	277	3,175	163
	Women	178	354	159	169	1,575	723

TABLE 433.—*Intelligence ratings of students in various departments of the University of Illinois.*

University department.	Median.	Lower quartile.	Upper quartile.	Per cent A grades.	Per cent A and B grades.	Number of cases.
Literature, arts, and sciences	145	128	162	65.4	93.0	1,410
Commerce	143	126	159	61.8	93.3	539
Agriculture	139	125	157	58.0	90.7	385
Engineering	144	127	160	63.9	93.2	755
Graduates	154	137	170	77.0	93.8	161

TABLE 434.—*Intelligence grades according to college class of students at the University of Illinois.*

College class.	Intelligence grades.						Number of cases.
	C−.	C.	C+.	B.	A.	A and B.	
Freshmen	0.1	0.8	7.7	33.4	58.0	91.4	1,342
Sophomores	.....	1.5	6.2	28.6	63.7	92.3	730
Juniors	.....	.7	5.1	27.8	66.3	94.1	607
Seniors	.....	.....	4.2	19.7	76.2	95.9	410

CHAPTER 20.

DISTRIBUTION OF SCORES ON THE TESTS IN EXAMINATIONS ALPHA AND BETA.

The following tables present the distributions of scores on the separate tests of the alpha and beta examinations as they were found among officers and among white and negro recruits. For the alpha tests these groups are unselected officers and unselected recruits; for the beta tests the recruit groups, both white and negro, include only men who were too illiterate to take the written examination or who had failed on it. These beta groups can not be fully defined; in fact the way in which they were selected differed from camp to camp. As norms, therefore, these distributions of scores on beta tests are suggestive merely; but for making comparisons of the beta tests with one another they may properly be used.

TABLE 435.—*Variables: Score on single alpha test × test. Group: White officers (Group VI).*

Score.	Test 1.	Test 2.	Test 3.	Test 4.	Test 5.	Test 6.	Test 7.	Test 8.
40				363			147	114
39				53			224	357
38				550			284	579
37				142			360	831
36				564			402	992
35				319			387	1,079
34				594			442	1,140
33				449			467	1,168
32				695			464	1,085
31				589			493	985
30				770			478	965
29				678			487	823
28				817			561	736
27				715			552	647
26				826			591	524
25				715			555	491
24				772	1,071		566	381
23				643	209		518	323
22				693	1,344		485	311
21				576	530		442	274
20		0		526	7,371	54	409	229
19		195		422	787	26	355	248
18		388		462	1,371	343	319	182
17		801		324	906	421	342	143
16		1,020	700	318	1,217	636	339	148
15		1,283	1,150	283	880	901	300	120
14		1,631	1,352	241	1,067	1,010	357	107
13		1,912	1,777	197	808	1,318	348	98
12	1,451	2,119	1,937	175	846	1,829	378	67
11	2,852	1,937	1,891	139	626	2,050	354	55
10	3,159	1,481	1,931	120	581	2,025	382	38
9	2,754	773	1,740	88	404	1,582	389	26
8	1,992	665	1,385	86	309	1,076	370	21
7	1,333	273	832	52	216	743	370	18
6	923	212	374	57	158	465	312	10
5	366	126	122	41	146	247	302	5
4	229	54	60	39	108	149	267	3
3	123	25	30	29	72	91	206	5
2	44	15	18	25	72	96	155	1
1	16	7	10	20	35	110	94	0
0	4	5	24	178	176	119	88	8
Total	15,346	14,925	15,333	15,345	15,310	15,291	15,341	15,337
Median	9.92	12.89	11.71	25.55	16.95	11.96	25.60	31.68

TABLE 436.—*Variables: Score on single alpha test × test. Group: White draft (Group I).*
For men who took alpha only or alpha and beta.

Score.	Test 1.	Test 2.	Test 3.	Test 4.	Test 5.	Test 6.	Test 7.	Test 8.
40				42			13	6
39				11			23	40
38				51			34	69
37				54			35	92
36				33			64	116
35				30			75	176
34				98			96	230
33				76			122	278
32				151			132	333
31				139			130	333
30				187			157	418
29				201			153	452
28				278			221	486
27				299			201	523
26				381			195	528
25				408			232	602
24				452	218		214	629
23				477	59		259	688
22				482	317		300	717
21				551	216		299	816
20		10		603	432	7	327	865
19		34		638	347	32	337	880
18		79		597	547	57	323	982
17		162		732	558	108	376	1,076
16		258	148	894	832	193	409	1,114
15		352	261	841	875	303	481	1,122
14		717	428	994	1,071	496	617	1,177
13		1,071	692	1,125	1,304	710	676	1,236
12	244	1,713	1,039	1,031	1,412	1,085	760	1,425
11	720	2,638	1,464	1,099	1,601	1,707	975	1,340
10	1,293	3,119	2,011	1,192	1,729	2,220	1,130	1,404
9	1,845	3,818	2,644	1,153	1,757	2,536	1,349	1,463
8	2,643	3,808	2,543	1,188	1,803	2,843	1,545	1,539
7	3,090	3,581	4,229	1,217	1,847	2,900	1,718	1,490
6	3,615	3,325	3,625	1,268	1,806	2,734	1,940	1,510
5	4,107	2,757	2,842	1,172	1,784	2,500	2,177	1,366
4	4,173	2,034	2,208	1,147	1,749	1,964	2,362	1,187
3	3,948	1,429	1,878	1,166	1,773	1,659	2,567	1,079
2	3,404	983	1,621	1,149	1,654	1,982	2,711	901
1	2,487	644	1,488	1,195	1,451	2,695	2,429	716
0	1,560	600	3,204	8,320	6,129	4,212	4,985	1,670
Total	33,129	33,132	32,325	33,122	33,271	32,943	33,149	33,104
Median	5.24	8.32	6.81	7.94	7.16	6.53	5.70	12.62

TABLE 437.—*Variables: Score on single alpha test × test. Group: Colored draft (Group IV).*
For men who took alpha only or alpha and beta or alpha and an individual examination.

Score.	Test 1.	Test 2.	Test 3.	Test 4.	Test 5.	Test 6.	Test 7.	Test 8.
40							1	0
39							0	1
38							0	1
37							0	1
36							1	2
35							1	3
34				1			0	1
33				1			2	4
32				3			2	11
31				3			6	8
30				11			4	8
29				5			3	12
28				5			3	11
27				6			5	18
26				10			7	22
25				10			3	19
24				16			5	24
23				20	2		10	33
22				13	4		12	36
21				23	2		7	48
20		2		36	10		7	33
19		0		24	10		5	54
18		1		40	20		10	73
17		0		43	25		18	70
16		3	5	43	29	2	21	83
15		5	7	63	36	3	24	96
14		19	12	69	64	6	31	98
13		19	18	74	88	11	38	132
12	3	39	26	93	91	23	54	129
11	15	101	33	118	130	41	63	158
10	30	180	64	119	132	96	90	161
9	71	311	99	158	160	161	111	245
8	111	416	199	154	216	214	147	232
7	200	587	309	144	228	268	186	262
6	329	719	398	185	291	354	240	323
5	451	816	429	189	359	442	306	353
4	657	766	445	229	399	437	356	388
3	864	685	501	250	492	427	481	407
2	1,091	620	590	289	532	606	565	443
1	1,333	641	784	388	573	996	727	532
0	1,403	636	2,642	3,731	2,681	2,477	3,012	1,978
Total	6,558	6,566	6,561	6,566	6,574	6,564	6,564	6,513
Median	2.50	4.92	1.81	0.88	2.06	1.81	1.37	3.75

TABLE 438.—*Variables: Score on single beta test × test. Group: White draft (Group I).*

For men who took beta only.

Score.	Test 1.	Test 2.	Test 3.	Test 4.	Test 5.	Test 6.	Test 7.
30				48			
29				7			
28				14			
27				11			
26				15			
25				11	11		
24				18	13		
23				29	20		
22				31	15		
21				37	21		
20				70	29	26	
19				57	82	34	
18				87	121	63	
17				113	171	103	
16		24		157	170	153	
15		91		206	239	244	
14		159		187	333	316	
13		224		273	383	403	
12		321	85	276	349	557	
11		374	185	390	555	691	
10	2	464	423	420	569	758	222
9	4	523	577	388	408	819	273
8	4	520	596	415	451	718	330
7	10	473	582	476	460	652	415
6	3	477	592	434	416	567	647
5	300	800	601	524	333	428	810
4	1,638	665	629	455	325	302	813
3	2,338	484	636	440	301	195	903
2	1,835	601	790	419	275	137	766
1	899	724	915	392	271	101	775
0	591	579	795	944	1,169	224	1,482
Total	7,504	7,503	7,496	7,492	7,493	7,491	7,436
Median	3.23	5.87	4.97	7.00	8.44	9.51	3.77

TABLE 439.—*Variables: Score on single beta test × test. Group: Colored draft (Group IV).*

For men who took beta only or beta and individual examination or alpha beta and an individual examination.

Score.	Test 1.	Test 2.	Test 3.	Test 4.	Test 5.	Test 6.	Test 7.
30				21			
29				6			
28				6			
27				8			
26				5			
25				12	4		
24				13	2		
23				14	7		
22				13	9		
21				21	8		
20				40	8	8	
19				27	15	11	
18				33	29	27	
17				54	33	28	
16		6		57	37	69	
15		11		88	58	123	
14		20		70	109	153	
13		48		97	116	228	
12		60	10	123	120	350	
11		118	22	194	245	496	
10	3	198	79	258	315	659	47
9	2	296	157	244	328	857	47
8	5	369	243	288	348	1,073	93
7	5	396	309	362	528	1,072	151
6	13	570	444	390	561	1,167	308
5	139	1,450	585	634	551	1,120	444
4	904	1,487	742	642	657	987	555
3	2,144	1,137	965	750	767	741	794
2	2,953	1,515	1,852	894	910	578	1,060
1	2,612	2,012	2,992	1,510	988	561	2,299
0	3,394	2,562	3,846	5,359	5,493	1,948	6,432
Total	12,174	12,246	12,246	12,222	12,246	12,256	12,230
Median	2.03	3.03	1.76	1.50	1.64	6.17	0.95

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